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We would also like to thank the many people in the federal government and the CEQ staff who took time to share their information and insights with us. While we acknowledge the help and support of many, we are solely responsible for the final selection and presentation of the data.

INTRODUCTION

Environmental Statistics 1978 is a book of tables. They contain environmental data, primarily in time series form, chosen to provide an accurate record of important and recent trends in the environment. These specific tables contain series that support the preparation of a companion volume, Environmental Conditions and Trends, a graphic and textual description of the state of the environment to be released later this year by the Council on Environmental Quality.

Environmental Statistics 1978 contains approximately 200 tables organized into twelve chapters dealing with land and land-based activities (population growth and distribution, land use, wetlands, wilderness, parks, historic sites, risk zones, human settlements, transportation, industrial production, solid waste, hazardous substances, cropland, forests, grazing land, wildlife, and energy), water (water resources and water quality), and air (air quality).

The data tables represent only a small portion of the series that could usefully be organized, summarized, and reported. We have begun by choosing many of the most obvious series, primarily from federal government sources. Particular attention has been given to preparing tables for series that are not readily available to analysts outside an agency.

Environmental Statistics 1978 is not comprehensive in coverage nor do the tables include sufficient detail for regional and local analysis. Also, no statistics on expenditures of time and money by private or government institutions have been included.

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Data Selection

We have tried to select series that reveal trends or interesting conditions important to understanding the nature and quality of the environment. The question of course is, What is important and to whom? And next, How well does a data series measure a given issue? Is the series meaningful, useful, and accurate? There are no fixed rules for answering these questions. The process of selecting series included discussions and review with individual staff members at the Council on Environmental Quality, agency personnel responsible for collecting or analyzing official statistics, discussions with our colleagues at SRI International, and other experts. We sought their advice as to the usefulness of the data and its accuracy. (Errors of bias introduced into a statistical series due to the methodology and procedures used to collect and summarize the data are particularly difficult to uncover and correct. During our review we omitted some series that were of great interest conceptually and for policy analysis, but were not generally accepted in the research community as adequate measures of a given phenomenon. This was particularly true in the areas of land use and land cover.)

For the most part, we selected data to show trends during the period 1950 to 1977. Most of the series are up-to-date as of November 1978. However, the more up-to-date the series, the more likely the latest figures may be revised. This is common practice throughout the government and users of the data should be cautious in using preliminary or estimated series for trend analysis.

Almost all series are shown on an annual basis. This allows for a standard table format and improves the usefulness of the data for comparing trends across areas, but obviously a bias is introduced. Each time interval is relevant for a particular analysis. Ambient air quality, for example, may be usefully measured and reported to the public on a daily, monthly, seasonal, and annual basis. The amount of mined land reclaimed, however, is probably best reported over a five-, ten-, or fifteen-year period.

Eleven of the series in the air and water quality chapters were taken directly from analyses done on UPGRADE (User-Prompted Graphic Data Evaluation), a data analysis system developed at the Council on Environmental Quality. Data users can modify and update these series directly (or develop their own) with the data bases available in the UPGRADE system.

Although we relied heavily on expert advice, in the end we were limited by time, money, space (the length of the book), our combined skills and knowledge of the federal statistical system, and, most of all, by the availability of the data.

Data Verification

Most of the tables come directly from federal agencies. Data tables were verified by proofing them against published or unpublished sources. Primary sources have been referenced whenever possible. Secondary sources are given when, as in the case of the Statistical Abstract prepared by the U.S. Bureau of the Census, they are more readily available and the accuracy of the data is deemed comparable to the primary source. When unpublished data are used, we have referenced the government office or division that produces the information as the source. Recent-year figures were often provided by agencies directly and are referenced accordingly.

In the process of verifying data, we found instances where the published figures were incomplete, totals did not add, labels were inaccurate, and so on. While these were corrected in our tables, we know others have not been caught and, of course, in the process we have no doubt introduced errors of our own. This problem is particularly endemic to the environmental field because no government or private institution has a mandate to organize environmental statistics for policy analysis and report these figures to the public on a periodic basis.

Table Preparation

Verified data tables were edited for consistency, accuracy, legibility and understanding. In some cases, units of measure were standardized (BTU's and Quads in energy, for example), but no attempt was made to standardize data to a common number of significant figures. Data tables were then entered into WYLBUR, a command computer language used to store and edit tables. Table printouts were proofed against original tables, corrected, reproofed, and then printed. Tables taken from non-government sources have been reprinted with the permission of the author or publisher.

Future Reports

Environmental Statistics 1978 was prepared primarily for reference purposes. Our hope is that in the future it will be expanded to include more topics and more types of data. Most importantly, we hope it becomes a periodical report. In future editions, we would like to include new time series on many of the following topics:

1) Noise: generation, sources, population exposure, annoyance, and health effects;

2) Critical areas: aquifer recharge areas, natural areas for wildlife, trails, and many other topics of land cover and land use;

3) Recreation: activities and water and land-based resources;

4) Materials and minerals use and recycling, particularly within industries;

5) Cost and expenditure data for environmental enhancement, protection, and rehabilitation by government and private institutions;

6) Attitudinal data: public perception of environmental conditions and problems; and

7) A selection of international comparisons from the State of the Environment Report of the Organisation for Economic Cooperation and Development and other international efforts.

We welcome any comments you may have about this volume, especially corrections for the tables and suggestions for additional series.

1

POPULATION AND LAND USE

1-1 Total United States Population, 1900-1978 and Projected to 2025

Year	Resident Population (1) (in thousands)
1900	76,094
1901	77,585
1902	79,160
1903	80,632
1904	82,165
1905	83,820
1906	85,437
1907	87,000
1908	88,709
1909	90,492
1910	92,407
1911	93,868
1912	95,331
1913	97,227
1914	99,118
1915	100,549
1916	101,966
1917	103,266
1918	103,203
1919	104,512
1920	106,466
1921	108,541
1922	110,055
1923	111,950
1924	114,113
1925	115,832
1926	117,399
1927	119,038
1928	120,501
1929	121,770
1930	123,077
1931	124,040
1932	124,840
1933	125,579
1934	126,374
1935	127,250
1936	128,053
1937	128,825
1938	129,825
1939	130,830
1940	132,457
1941	133,669
1942	134,617
1943	135,107
1944	133,915
1945	133,434
1946	140,636
1947	144,083
1948	146,730
1949	149,304
1950	151,868
1951	153,982
1952	158,393
1953	158,956
1954	161,884
1955	165,069
1956	168,088
1957	171,187
1958	174,149
1959	177,135
1960	179,979
1961	182,992
1962	185,771
1963	188,483
1964	191,141
1965	193,526
1966	195,576
1967	197,457
1968	199,399
1969	201,385
1970	203,810
1971	206,219
1972	208,234
1973	209,859
1974	211,389
1975	213,032
1976	214,669
1977	216,332
1978	218,013

1-1 Total United States Population, 1900-1978 and Projected to 2025 (cont.)

Year (2)	Projected Resident Population (in thousands)		
	Series 1 (3)	Series 2 (3)	Series 3 (3)
1975	213,641	213,450	213,323
1980	225,705	222,769	220,356
1985	241,274	234,068	228,355
1990	257,663	245,075	235,581
1995	272,685	254,495	241,198
2000	287,007	262,494	245,098
2005	303,144	270,377	247,926
2010	322,049	278,754	250,193
2015	342,340	286,960	251,693
2020	362,348	294,046	251,884
2025	382,011	299,713	250,421

(1) As of July 1 of year noted. Excludes Armed Forces abroad.

(2) For comparison, population estimates for 1970 and 1974 were 204,875 and 211,909 respectively.

(3) The three projection series reflect different assumptions about the ultimate level of completed cohort fertility, that is, the average number of births a woman has in her lifetime. Series 1 assumes a total of 2.7 births per woman; Series 2, a total of 2.1; and Series 3, a total of 1.7.

Sources: U.S. Bureau of the Census, Statistical Abstract, 1976, Table 2, p. 5; U.S. Bureau of the Census, Current Population Reports (CPR), Series P-25, Nos. 541 and 729.

1-2 Rate of Population Growth, 1900-1978

Year	Rate (percent)
1900	1.7
1901	2.0
1902	2.0
1903	1.9
1904	1.9
1905	2.0
1906	1.9
1907	1.8
1908	2.0
1909	2.0
1910	1.8
1911	1.6
1912	1.8
1913	1.9
1914	1.7
1915	1.4
1916	1.4
1917	1.3
1918	.8
1919	.9
1920	1.6
1921	1.7
1922	1.5
1923	1.8
1924	1.7
1925	1.4
1926	1.4
1927	1.3
1928	1.1
1929	1.1
1930	.9
1931	.7
1932	.6
1933	.6
1934	.7
1935	.7
1936	.6
1937	.7
1938	.8
1939	.8
1940	.9
1941	1.0
1942	1.3
1943	1.3
1944	1.1
1945	1.0
1946	1.5
1947	1.8
1948	1.7
1949	1.7
1950	1.6
1951	1.7
1952	1.7
1953	1.7
1954	1.8
1955	1.8
1956	1.8
1957	1.7
1958	1.7
1959	1.7
1960	1.6
1961	1.6
1962	1.5
1963	1.4
1964	1.3
1965	1.2
1966	1.1
1967	1.0
1968	1.0
1969	1.0
1970	1.09
1971	1.07
1972	.82
1973	.77
1974	.71
1975	.80
1976	.70
1977	.79
1978	.78

Rates are based on the change in population during the calendar year as a percent of the midyear population.

Beginning in 1940, data are for total U.S. population including Armed Forces overseas. Data prior to 1940 exclude Alaska, Hawaii, and Armed Forces overseas, except 1917-1919 when Armed Forces overseas were included.

Sources: Office of Management and Budget (OMB), Social Indicators, 1973, pp. 232, 246, and 249; U.S. Bureau of the Census, Historical Statistics of the United States, Colonial Times to 1970, p. 8; U.S. Bureau of the Census, Statistical Abstract, 1978, Table 2, p. 6; and U.S. Bureau of the Census, Current Population Reports, Series P-25, No. 729.

1-3 Population by State, 1960-1975

State	Population									Average Annual Percent Change		
							1975 (preliminary)					
	1960 (thousands)	1965 (thousands)	1970 (thousands)	1972 (thous.)	1973 (thous.)	1974 (thous.)	Rank Order	Total (thous.)	Per Sq. Mi. of Land Area	July 1, 1950-July 1, 1960	July 1, 1960-July 1, 1970	July 1, 1970-July 1, 1975
U.S.	179,979 (a)	193,526 (a)	203,806 (a)	208,230	209,844	211,381	(x)	213,121	60.3	1.7	1.3	0.9
N.E.	10,532	11,329	11,883	12,105	12,145	12,148	(x)	12,198	193.8	1.2	1.2	0.5
Maine	975	997	997	1,026	1,039	1,049	38	1,059	34.2	0.6	0.2	1.2
N.H.	609	676	742	774	794	808	42	818	90.6	1.4	2.0	2.0
Vt.	389	404	446	460	466	468	48	471	50.8	0.3	1.4	1.1
Mass.	5,160	5,502	5,706	5,796	5,799	5,799	10	5,828	744.7	1.0	1.0	0.4
R.I.	855	893	951	969	967	938	39	927	883.7	0.8	1.1	-0.5
Conn.	2,544	2,857	3,041	3,080	3,080	3,086	24	3,095	636.6	2.4	1.8	0.3
M.A.	34,270	36,122	37,274	37,621	37,401	37,264	(x)	37,263	371.4	1.3	0.8	(-z)
N.Y.	16,838	17,734	18,268	18,367	18,214	18,101	2	18,120	378.8	1.3	0.8	-0.2
N.J.	6,103	6,767	7,193	7,349	7,325	7,322	9	7,316	972.7	2.3	1.7	0.3
Pa.	11,329	11,620	11,813	11,905	11,862	11,841	4	11,827	263.0	0.8	0.4	(z)
E.N.C.	36,291	38,406	40,313	40,793	40,824	40,902	(x)	40,979	167.9	1.7	1.1	0.3
Ohio	9,734	10,201	10,664	10,722	10,743	10,745	6	10,759	262.6	2.0	0.9	0.2
Ind.	4,674	4,922	5,202	5,286	5,304	5,313	12	5,311	147.1	1.7	1.1	0.4
Ill.	10,086	10,603	11,128	11,244	11,176	11,160	5	11,145	199.9	1.4	1.0	(z)
Mich.	7,834	8,357	8,890	9,013	9,061	9,117	7	9,157	161.2	2.0	1.3	0.6
Wis.	3,962	4,232	4,429	4,526	4,539	4,566	16	4,607	84.6	1.4	1.1	0.8
W.N.C.	15,424	15,819	16,360	16,617	16,635	16,657	(x)	16,690	32.9	0.9	0.6	0.4
Minn.	3,425	3,592	3,815	3,877	3,890	3,905	19	3,926	49.5	1.3	1.1	0.6
Iowa	2,756	2,742	2,832	2,884	2,863	2,857	25	2,870	51.3	0.5	0.3	0.3
Mo.	4,326	4,467	4,688	4,747	4,768	4,772	15	4,763	69.0	0.9	0.8	0.3
N.Dak.	634	649	620	634	635	636	45	635	9.2	0.2	-0.2	0.5
S.Dak.	683	692	668	680	682	681	44	683	9.0	0.4	-0.2	0.4
Nebr.	1,417	1,471	1,488	1,528	1,533	1,541	35	1,546	20.2	0.7	0.5	0.8
Kans.	2,183	2,206	2,249	2,268	2,264	2,266	31	2,267	27.7	1.3	0.3	0.2
S.A.	26,091	28,743	30,805	31,921	32,602	33,208	(x)	33,715	126.3	2.1	1.7	1.8
Del.	449	507	551	571	573	577	47	579	292.1	3.4	2.1	1.0
Md.	3,113	3,600	3,938	4,048	4,074	4,089	18	4,098	414.3	2.8	2.4	0.8
D.C.	765	797	756	752	734	721	(x)	716	11,737.7	-0.5	-0.1	-1.1
Va.	3,986	4,411	4,659	4,765	4,844	4,910	13	4,967	124.9	1.0	1.6	1.3
W.Va.	1,853	1,786	1,751	1,795	1,788	1,784	34	1,803	74.9	-0.8	-0.6	0.6
N.C.	4,573	4,863	5,098	5,221	5,302	5,375	11	5,451	111.7	1.2	1.1	1.3
S.C.	2,392	2,494	2,597	2,688	2,724	2,775	26	2,818	93.2	1.2	0.8	1.6
Ga.	3,956	4,332	4,607	4,733	4,818	4,877	14	4,926	84.8	1.4	1.5	1.3
Fla.	5,004	5,954	6,848	7,347	7,745	8,099	8	8,357	154.5	5.9	3.2	4.1

1-3 Population by State, 1960-1975 (cont.)

State	Population									Average Annual Percent Change		
							1975 (preliminary)					
	1960 (thousands)	1965 (thousands)	1970 (thousands)	1972 (thous.)	1973 (thous.)	1974 (thous.)	Rank Order	Total (thous.)	Per Sq. Mi. of Land Area	July 1, 1950-July 1, 1960	July 1, 1960-July 1, 1970	July 1, 1970-July 1, 1975
E.S.C.	12,073	12,627	12,839	13,156	13,286	13,412	(x)	13,544	75.7	0.5	0.6	1.1
Ky.	3,041	3,140	3,231	3,306	3,328	3,354	23	3,396	85.6	0.4	0.6	1.0
Tenn.	3,575	3,798	3,937	4,072	4,095	4,149	17	4,188	101.3	0.7	1.0	1.2
Ala.	3,274	3,443	3,451	3,521	3,546	3,575	21	3,614	71.3	0.5	0.5	0.9
Miss.	2,182	2,246	2,220	2,256	2,317	2,334	29	2,346	49.6	(z)	0.2	1.1
W.S.C.	17,010	18,209	19,388	19,982	20,277	20,529	(x)	20,855	48.8	1.5	1.3	1.5
Ark.	1,789	1,894	1,932	2,008	2,035	2,068	33	2,116	40.7	-0.6	0.8	1.8
La.	3,260	3,496	3,652	3,738	3,746	3,762	20	3,791	84.4	1.9	1.1	0.7
Okla.	2,336	2,440	2,567	2,633	2,669	2,681	27	2,712	39.4	0.5	0.9	1.7
Tex.	9,624	10,378	11,236	11,604	11,828	12,017	3	12,237	46.7	2.2	1.6	1.7
Mt.	6,916	7,740	8,348	8,880	9,200	9,440	(x)	9,644	11.3	3.1	1.9	2.9
Mont.	679	706	698	716	730	737	43	748	5.1	1.4	0.3	1.4
Idaho	671	686	718	755	776	796	41	820	9.9	1.3	0.7	2.7
Wyo.	331	332	334	346	353	362	49	374	3.8	1.3	(z)	2.3
Colo.	1,769	1,985	2,223	2,364	2,468	2,515	28	2,534	24.4	2.9	2.3	2.7
N.Mex.	954	1,012	1,023	1,076	1,099	1,119	37	1,147	9.4	3.3	0.7	2.3
Ariz.	1,321	1,584	1,792	1,963	2,073	2,160	32	2,224	19.6	5.7	3.1	4.4
Utah	900	991	1,066	1,127	1,150	1,179	36	1,206	14.7	2.6	1.7	2.5
Nev.	291	444	493	533	551	574	46	592	5.4	6.0	5.4	3.7
Pac.	21,368	24,464	26,600	27,156	27,474	27,821	(x)	28,234	31.7	3.4	2.2	1.2
Wash.	2,855	2,967	3,413	3,418	3,431	3,494	22	3,544	53.2	1.8	1.8	0.8
Oreg.	1,772	1,937	2,101	2,185	2,219	2,255	30	2,288	23.8	1.5	1.7	1.7
Calif.	15,870	18,585	20,007	20,411	20,652	20,876	1	21,185	135.5	4.0	2.3	1.1
Alaska	229	271	304	325	330	341	50	352	.6	5.4	2.9	3.0
Hawaii	642	704	774	816	841	854	40	865	134.6	2.6	1.9	2.2

Regions include New England (N.E.), Middle Atlantic (M.A.), East North Central (E.N.C.), West North Central (W.N.C.), South Atlantic (S.A.), East South Central (E.S.C.), West South Central (W.S.C.), Mountain (Mt.), and Pacific (Pac.).

Estimates as of July 1, except as indicated. Includes Armed Forces stationed in area. Minus sign (-) denotes decrease.

(x) Not applicable. (z) Less than 0.05 percent.

(a) U.S. total revised. State data revisions not available; therefore, detail will not add to total.

Source: U.S. Bureau of the Census, Statistical Abstract, 1976, Table 10, p. 11.

1-4 Total Population (1) of the United States by Region (2), 1950-1976
(in thousands)

Year	Northeast	North Central	South	West
1950	39,559	44,632	47,347	20,331
1951	39,644	45,053	48,321	20,964
1952	40,178	45,673	48,840	21,701
1953	41,045	46,436	48,927	22,548
1954	41,823	47,515	49,266	23,278
1955	42,278	48,511	50,224	24,056
1956	42,628	49,309	51,151	25,001
1957	43,095	49,946	52,287	25,859
1958	43,766	50,572	53,123	26,687
1959	44,371	51,124	54,077	27,563
1960	44,802	51,715	55,174	28,284
1961	45,384	52,185	56,158	29,246
1962	45,833	52,583	57,179	30,142
1963	46,402	53,073	58,008	30,955
1964	46,953	53,655	58,853	31,624
1965	47,451	54,225	59,579	32,205
1966	47,788	54,840	60,205	32,667
1967	48,106	55,289	60,771	33,207
1968	48,435	55,692	61,489	33,696
1969	48,678	56,106	62,190	34,332
1970	49,152	56,670	63,020	34,969
1971	49,582	57,049	64,013	35,575
1972	49,689	57,353	65,112	36,080
1973	49,545	57,465	66,161	36,688
1974	49,413	57,558	67,149	37,262
1975	49,456	57,636	68,041	37,899
1976 (3)	49,503	57,739	68,855	38,562

(1) Resident Population.
(2) Regions contain the following states:
Northeast: Maine, Vermont, New Hampshire, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, Pennsylvania;
North Central: Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, Iowa, Missouri, Kansas, Nebraska, North Dakota, South Dakota;
South: Maryland, Delaware, Virginia, West Virginia, District of Columbia, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Tennessee, Kentucky, Louisiana, Arkansas, Oklahoma, Texas;
West: Montana, Wyoming, Idaho, Colorado, Utah, Nevada, New Mexico, Arizona, California, Oregon, Washington, Hawaii, Alaska.
(3) Data for 1976 are provisional.

Sources: U.S. Bureau of the Census, Current Population Reports, P-25, No. 640, "Annual Estimates of the Resident Population of States," November 1976, Table 3, p. 21, and front cover; U.S. Bureau of the Census, Current Population Reports, P-25, No. 460, "Annual Estimates of the Total Resident Population of States," June 7, 1971, Table 1, p. 8; U.S. Bureau of the Census, Current Population Reports, P-25, No. 304, "Estimates of the Total Resident Population of States," April 8, 1965, Table 2, p. 10; and U.S. Bureau of the Census, Current Population Reports, P-25, No. 642, December 1976, Table 1, p. 3.

1-5 Regional (1) Growth Rates, 1950-1975
(in percentages)

Years	Northeast	North Central	South	West
1950-1955	6.87	8.69	6.08	18.32
1955-1960	5.97	6.61	9.86	17.58
1960-1965	5.91	4.85	7.98	13.86
1965-1970	3.58	4.51	5.78	8.58
1970-1975	.62	1.71	7.97	8.38

(1) Regions contain the following states:
Northeast: Maine, Vermont, New Hampshire, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, Pennsylvania;
North Central: Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, Iowa, Missouri, Kansas, Nebraska, North Dakota, South Dakota;
South: Maryland, Delaware, Virginia, West Virginia, District of Columbia, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Tennessee, Kentucky, Louisiana, Arkansas, Oklahoma, Texas;
West: Montana, Wyoming, Idaho, Colorado, Utah, Nevada, New Mexico, Arizona, California, Oregon, Washington, Hawaii, Alaska.

Source: U.S. Bureau of the Census, Current Population Reports, P-25, Nos. 640, 460, 304, and 642.

1-6 Resident Population and Population Density in Counties Within 50 Miles of Coastal Shorelines, 1940-1975

Year	U.S. Total	Counties in Coastal Regions					Balance of U.S.
		Total	Atlantic	Pacific	Great Lakes	Gulf of Mexico	
Land Area (in thousands of sq. mi.)							
1970	2,964	468	122	118	134	94	2,496
Population (in millions)							
1940	131.7	60.5	29.9	7.5	18.9	4.2	71.2
1950	150.7	73.5	34.6	11.5	21.8	5.6	77.2
1960	178.5	92.7	41.7	16.8	26.4	7.8	85.7
1970	202.1	108.5	48.2	21.5	29.3	9.5	93.8
1975	211.4	112.6	49.6	22.6	29.6	10.7	98.9
Population (in percent)							
1940	100	46	23	6	14	3	54
1950	100	49	23	8	15	4	51
1960	100	52	23	9	15	4	48
1970	100	54	24	11	15	5	46
1975	100	53	24	11	14	5	47
Population Per Square Mile							
1940	44.4	129.3	244.4	64.1	140.9	44.8	28.5
1950	50.8	157.2	283.3	97.6	162.9	59.8	30.9
1960	60.2	198.3	341.6	142.7	197.3	83.1	34.3
1970	68.2	232.0	394.4	182.3	219.1	101.1	37.6
1975	71.3	240.7	406.3	187.5	221.4	113.9	39.6

As of April 1. Excludes Alaska and Hawaii. Covers 611 counties and independent cities which are entirely or substantially within 50 miles of U.S. coastal shorelines. Great Lakes region includes St. Lawrence River.

Source: U.S. Bureau of the Census, Statistical Abstract 1977, Table 7, p. 9.

1-7 Increase in Population Density, Total United States and Coastal Areas, 1940-1975

Area	Population Per Sq. Mi.		Percent Increase
	1940	1975	
Total U.S.	44.4	71.3	61
Total Coastal	129.3	240.7	86
Pacific	64.1	192.0	200
Gulf	44.8	113.9	154
Atlantic	244.4	406.3	66
Great Lakes	140.9	221.4	57
Others (balance of U.S.)	28.5	39.6	39

As of April 1. Excludes Alaska and Hawaii. Covers 611 counties and independent cities which are entirely or substantially within 50 miles of U.S. coastal shorelines. Great Lakes region includes St. Lawrence River.

Source: U.S. Bureau of the Census, Statistical Abstract 1977, Table 7, p. 9.

1-8 Urban and Rural Population of the United States, 1900-1970

Year	Urban (1)	Rural	Total
1900 (2)	30,583,411	45,411,164	75,994,575
1910	42,623,383	49,348,883	91,972,266
1920	54,304,603	51,406,017	105,710,620
1930	68,954,823	53,820,223	122,775,046
1940	74,423,702	57,245,573	131,669,275
1950	96,467,686	54,229,675	150,697,361
1960 (3)	125,268,750	54,054,425	179,323,175
1970 (4)	149,324,930	53,886,996	203,211,926

(1) Urban definition refers to the U.S. Bureau of the Census definition for that year. According to the definition adopted for use in the 1970 census, the urban population comprises all persons living in urbanized areas and in places of 2,500 inhabitants or more outside urbanized areas. More specifically, the urban population consists of all persons living in (a) places of 2,500 inhabitants or more incorporated as cities, villages, boroughs (except Alaska), and towns (except in the New England States, New York, and Wisconsin), but excluding those persons living in the rural portions of extended cities; (b) unincorporated places of 2,500 inhabitants or more; and (c) other territory, incorporated or unincorporated, included in urbanized areas.

(2) Definition modified to exclude population in incorporated places and New England towns in the 2,500-3,999 size range.

(3) Complete-count data for total, urban, and rural; 25-percent sample data for rural nonfarm and rural farm. Denotes first year for which figures include Alaska and Hawaii.

(4) Complete-count data for total, urban, and rural; 20-percent sample data for rural nonfarm and rural farm. Complete-count figures exclude 23,372 persons for whom data are not available. 1970 Census tables show a population of 203,211,926. The net difference of 23,372 reflects errors found after the tabulations were compiled.

Source: U.S. Bureau of the Census, Historical Statistics, Colonial Times to 1970, p. 12.

1-9 Population in Metropolitan and Nonmetropolitan Areas and by Farm and Nonfarm Residence, 1950-1977

Residence	1950		1960		1970 (1)		1977 (1)	
	Total (millions)	Percent	Total (millions)	Percent	Total (millions)	Percent	Total (millions)	Percent
Total	151.3	100.0	179.3	100.0	199.8	100.0	212.6	100.0
SMSA's, Total	94.6	62.5	119.6	66.7	137.1	68.6	143.1	67.3
Central Cities	53.7	35.5	59.9	33.4	62.9	31.5	60.0	28.2
Outside Central Cities	40.9	27.0	59.6	33.3	74.2	37.1	83.1	39.1
Nonmetropolitan Areas	56.7	37.5	59.7	33.3	62.8	31.4	69.5	32.7

Residence	1950		1960		1970 (2,3)		1977 (3)	
	Total (millions)	Percent	Total (millions)	Percent	Total (millions)	Percent	Total (millions)	Percent
Total	151.3	100.0	179.3	100.0	199.2	100.0	211.8	100.0
Farm	23.0	15.3	13.4	7.5	9.7	4.9	7.8	3.7
Inside SMSA	2.5	1.7	1.6	.9	1.0	0.5	1.5	0.7
Outside SMSA	20.6	13.6	11.8	6.6	8.7	4.4	6.3	3.0
Nonfarm	128.3	84.8	165.9	92.5	189.5	95.1	204.0	96.3

SMSA - Standard Metropolitan Statistical Area. Except where noted otherwise, includes the 243 SMSA's used in the 1970 Census of Population.

(1) Resident population, excluding inmates of institutions and members of the Armed Forces living in barracks.

(2) Includes the 212 SMSA's used in the 1960 Census of Population.

(3) Civilian noninstitutional population.

Sources:
SMSA and Nonmetropolitan: 1950 and 1960: U.S. Bureau of the Census, Statistical Abstract 1976, Table 15, p. 16.
1970 and 1977: U.S. Bureau of the Census, Social and Economic Characteristics of the Metropolitan and Nonmetropolitan Population: 1977 and 1970, Current Population Reports, Series P-23, No. 75, Table D, p. 4.
Farm and Nonfarm: 1950: U.S. Bureau of the Census, Census of Population, 1950.
1960: U.S. Bureau of the Census, Census of Population, 1960, U.S. Summary 1960 Population, p. 1-237, General, Social and Economic Characteristics of United States Population.
1970: U.S. Bureau of the Census, unpublished data.
1977: U.S. Bureau of the Census, Farm Population of the United States: 1977, Current Population Reports, Series P-27, No. 51, Table 4, p. 8; and U.S. Bureau of the Census, unpublished data.

1-10 Metropolitan Areas with Population Increases of Twenty Percent or More, 1970-1975

City	Percent Increase
1. Fort Myers, Fla.	47.7
2. Fort Lauderdale, Fla.	39.1
3. Sarasota, Fla.	35.0
4. Fort Collins, Col.	34.5
5. West Palm Beach, Fla.	31.8
6. Killeen, Texas	31.7
7. Orlando, Fla.	29.1
8. Tallahassee, Fla.	26.8
9. Fort Smith, Arkansas (1)	25.6
10. Tucson, Arizona	25.5
11. Tampa, Fla.	25.4
12. Phoenix, Arizona	25.4
13. Bryan-College Station, Texas	24.7
14. Daytona, Fla.	23.8
15. Gainesville, Fla.	23.7
16. Provo, Utah	22.9
17. Santa Cruz, Calif.	22.4
18. Anchorage, Alaska	22.4
19. Boise City, Idaho	22.3
20. Austin, Texas	22.2
21. Colorado Springs, Col.	22.0
22. Las Vegas, Nevada	21.7
23. McAllen-Pharr-Edinburg, Texas	21.6
24. Clarksville-Hopkinsville, Tenn./Ky.	20.9
25. Greeley, Col.	20.6
26. Brownsville-Harlingen-San Benito, Texas	20.6
27. Anaheim-Santa Ana-Garden Grove, Cal.	20.3
28. Pascagoula-Moss Point, Miss.	20.2
29. Reno, Nevada	20.0
30. Santa Rosa, Cal.	19.9
31. Lakeland-Winter Haven, Fla.	19.8
32. Wilmington, N.C.	19.6

(1) The rapid increase in population growth in Fort Smith, Arkansas (25.6%) is due to the influx of Vietnam refugees in Fort Chaffee in 1974. This is a temporary presence.

Sources: U.S. Bureau of the Census, Current Population Reports, P-25, No. 618, and U.S. Bureau of the Census, unpublished data.

1-11 Population Growth in Metropolitan and Nonmetropolitan Counties, 1950-1974

Area	Average Annual Rate of Growth (in percent)		
	1950-1960	1960-1970	1970-1974
Total, U.S.	1.69	1.25	0.92
Metropolitan Counties	2.32	1.57	0.79
Nonmetropolitan Counties	0.30	0.43	1.27

Source: Beale, Calvin, and Fuguitt, Glenn, "The New Pattern of Nonmetropolitan Population Change," Center for Demography and Ecology, University of Wisconsin (1975); Forstall, Richard, Population Division, Bureau of the Census, "Trends in Metropolitan and Nonmetropolitan Population Growth Since 1970" (May, 1975); Council on Environmental Quality, Environmental Quality - 1976, p. 287.

1-12 Patterns of Major Land Use, 1900-1974
(in millions of acres)

Major Land Uses	1900	1910	1920	1930	1940	1950	1959	1969	1974
Cropland (1)	319	347	402	413	400	409	392	384	382
Grassland, Pasture, and Range (2)	832	778	731	719	719	701	699	692	681
Forest Land (3)	719	721	721	722	727	721	728	723	718
Other (4)	400	424	416	416	426	442	452	465	483
Specialized (5)		60	68	73	85	134	146	172	182
Unused Land (6)		364	348	343	341	308	306	293	301
Total, U.S. (7) (50 states)	2270	2270	2270	2270	2272	2273	2271	2264	2264

(1) Cropland (1900-1974): Excludes cropland used only for pasture.

(2) Grassland, Pasture, and Range (1900-1974): Grassland pasture, other nonforested grazing land, and cropland used only for pasture. Includes some idle grassland, particularly before 1920.

(3) Forest Land (1900-1969): Exclusive of reserved forest land in parks, wildlife refuges, and other special-use areas.
(1974): Excludes reserved forest land and some unreserved areas totaling about 31 million acres duplicated in parks and other special uses of land.

(4) Other is the combination of specialized land and unused land.

1-12 Patterns of Major Land Uses, 1900-1974 (cont.)

(5) Specialized (1910-1940): Urban and built-up areas (including cities and towns, rural highway and road rights-of-way, railroads, airports, and public institutions in rural areas) and nonurban special-use areas (including Federal and State parks and other rural parks, recreational areas, wildlife refuges, national defense sites, flood-control areas, and Federal industrial areas) and also land having slight surface-use value (desert, rock, marshes, tundra, etc.). Farmsteads, farm road and lane areas of 10 to 14 million acres for the specified years are not included. The estimates for farmsteads varied in proportion to the number of farms. [1900-1940 data based on estimates (48 states) of specific items from U.S. Census Reports; Agriculture Yearbooks; National Resource Planning Board Reports; and other sources, such as basic unpublished data assembled for these publications.] 50 state estimates based on a proportion using 48 state and 50 state data for 1959 (13% increase from 48 to 50 state data [134 to 151] using Major Uses of Land, 1969, p. 4, and Major Uses of Land and Water, 1959, p. 10.
(1950-1959): Urban areas, highways and roads, farmsteads, parks, and military reservations.
(1969-1974): Urban, transportation, recreational, and other specific uses such as parks, wildlife refuges, national defense and farmsteads, farm roads and lanes.

(6) Unused Land includes miscellaneous uses such as marshes, open bare rock areas, deserts, tundra, and other uses not inventoried. 1920 and 1940 were estimated by subtracting Specialized from Other.

(7) Changes in total land area are attributable to changes in methods and materials used in occasional remeasurements and to increases in the area of artificial reservoirs. Estimated data for 1900-1959 assume essentially no change in Alaska and Hawaii prior to 1950. The estimates are not strictly comparable.

Sources: U.S. Department of Agriculture, Economic Research Service, Major Uses of Land in the United States, Summary for 1969, Agricultural Economic Report No. 247, p. 4; U.S. Department of Agriculture, Economic Research Service, Major Uses of Land and Water in the United States, Summary for 1959, Agricultural Economic Report No. 13, p. 11; and U.S. Department of Agricultural, Economics, Statistics, and Cooperatives Service, Major Uses of Land in the United States, Summary for 1974, draft, June, 1978.

1-13 Major Uses of Land in the United States, by State and Region, 1974
(in thousands of acres)

State and Region	Cropland (1)	Grassland, Pasture and Range (2)	Forest Land (3)	Special Uses (4)	Other Land (5)	Approximate Land Area (6)
Maine	653	142	17,505	779	710	19,789
New Hampshire	174	34	5,046	304	219	5,777
Vermont	812	234	4,384	263	238	5,931
Massachusetts	264	52	2,848	1,208	637	5,009
Rhode Island	29	5	395	190	52	671
Connecticut	234	46	1,846	661	325	3,112
New York	6,085	1,580	14,897	5,502	2,548	30,612
New Jersey	714	54	1,856	1,598	591	4,813
Pennsylvania	5,930	1,026	17,638	3,714	470	28,778
Delaware	546	8	390	186	138	1,268
Maryland	1,893	209	2,925	1,028	275	6,330
District of Columbia				39		39
Northeast	17,334	3,390	69,730	15,472	6,203	112,129
Michigan	8,345	1,241	19,000	3,867	3,910	36,363
Wisconsin	11,866	2,095	14,891	2,664	3,341	34,857
Minnesota	23,906	1,954	18,415	4,004	2,466	50,745
Lakes States	44,117	5,290	52,306	10,535	9,717	121,965
Ohio	12,705	1,610	6,422	2,983	2,504	26,224
Indiana	14,079	1,487	3,870	2,041	1,625	23,102
Illinois	25,010	1,834	3,745	3,211	1,879	35,679
Iowa	28,189	2,152	2,430	1,968	1,063	35,802
Missouri	20,481	6,610	12,661	2,321	2,084	44,157
Corn Belt	100,464	13,693	29,128	12,524	9,155	164,964
North Dakota	30,298	10,528	419	1,532	1,562	44,339
South Dakota	19,680	24,670	1,700	1,590	971	48,611
Nebraska	23,410	22,137	1,032	1,618	752	48,949
Kansas	31,625	15,950	1,363	2,210	1,196	52,344
Northern Plains	105,013	73,285	4,514	6,950	4,481	194,243
Virginia	4,690	1,819	16,076	2,127	747	25,459
West Virginia	1,617	717	12,126	568	377	15,405
North Carolina	6,576	1,050	20,223	2,731	651	31,231
Kentucky	9,397	2,013	11,888	1,519	559	25,376
Tennessee	8,376	1,899	12,820	2,193	1,162	26,450
Appalachian	30,656	7,498	73,133	9,138	3,496	123,921
South Carolina	3,565	667	12,402	1,599	1,111	19,344
Georgia	7,148	1,731	24,869	2,766	653	37,167
Florida	4,198	6,026	17,652	5,647	1,095	34,618
Alabama	5,797	2,917	21,333	1,768	637	32,452
Southeast	20,708	11,341	76,256	11,780	3,496	123,581

1-13 Major Uses of Land in the United States, by State and Region, 1974 (cont.)

State and Region	Cropland (1)	Grassland, Pasture and Range (2)	Forest Land (3)	Special Uses (4)	Other Land (5)	Approximate Land Area (6)
Mississippi	8,709	2,620	16,892	1,281	767	30,269
Arkansas	10,286	2,559	18,236	1,566	598	33,245
Louisiana	6,059	2,270	15,342	1,731	3,353	28,755
Delta States	25,054	7,449	50,470	4,578	4,718	92,269
Oklahoma	15,831	16,235	9,296	2,029	629	44,020
Texas	37,938	95,803	24,043	6,852	3,130	167,766
Southern Plains	53,769	112,038	33,339	8,881	3,759	211,786
Montana	16,021	49,465	19,899	4,633	3,158	93,176
Idaho	6,395	20,840	18,030	4,078	3,570	52,913
Wyoming	2,730	46,016	5,885	5,375	2,204	62,210
Colorado	10,959	29,274	19,387	3,238	3,552	66,410
New Mexico	2,302	50,525	17,256	5,325	2,295	77,703
Arizona	1,645	40,941	17,420	8,709	3,872	72,587
Utah	1,996	23,711	14,720	5,185	6,629	52,541
Nevada	753	46,673	7,255	7,235	8,412	70,328
Mountain	42,801	307,445	119,852	43,778	33,992	547,868
Washington	8,367	6,679	20,534	5,337	1,688	42,605
Oregon	5,276	23,172	29,387	2,655	1,067	61,557
California	11,143	23,910	39,826	16,292	8,900	100,071
Pacific	24,786	53,761	89,747	24,284	11,655	204,233
U.S. 48-State Total	464,702	595,190	598,475	147,920	90,672	1,896,959
Alaska	25	1,625	118,076	32,902	209,888	362,516
Hawaii	357	1,018	1,626	842	269	4,112
U.S. 50-State Total	465,084	597,833	718,177	181,664	300,829	2,263,587

(1) Total acreage in crop rotation.
(2) Grassland and other nonforested pasture and range in farms excluding cropland used only for pasture, plus estimates of open or nonforested grazing land not in farms.
(3) Excludes reserved forest land and some unreserved areas totaling about 31 million acres duplicated in parks and other special uses of land.
(4) Urban, transportation, recreational and other special uses of land.
(5) Miscellaneous areas such as marshes, open swamps, bare rock areas, deserts, and special uses not inventoried.
(6) Approximate land area as established by the Bureau of the Census in conjunction with the 1970 Census of Population. Includes all dryland and land temporarily or partially covered with water, such as marshland, swamps, and river flood plains; streams, sloughs, estuaries, and canals less than one-eighth mile wide; and lakes, reservoirs, and ponds less than 40 acres in area.

Source: U.S. Department of Agriculture, Economics, Statistics, and Cooperatives Service, Major Uses of Land in the United States, Summary for 1974, draft, June 1978.

1-14 Specialized Land Uses, 1919-1974
(in thousands of acres)

Land Use Classifications	48 Contiguous States					50 States		
	1919	1930	1945	1954	1959	1959	1969	1974
Urban (1)	10,000	N.A.	15,012	18,600	27,121	27,217	34,590	34,817
Farmsteads, Farmroads(2)	15,000	N.A.	12,428	11,000	10,110	10,136	8,420	8,067
Roadways (3)	20,000	N.A.	19,138	19,800	20,407	20,464	20,977	21,135
Railroads, Airports (4)	4,000	N.A.	4,747	4,700	4,722	4,755	4,976	5,129
Public Facilities (5)	N.A.	N.A.	26,127	24,700	25,249	27,510	27,505	27,050
Public Recreation and Wildlife Areas (6)	13,000	N.A.	22,580	27,500	46,447	61,435	81,337	87,466
Total	68,000	73,000	100,032	106,300	134,056	151,517	177,805	181,644

N.A. - Not Available.

(1) (1919-1969): Includes acreages for places of 1,000 - 2,500 in population; (1974): Includes urbanized areas and other incorporated and unincorporated places of 2,500 population or more. Estimates are based on provisional population estimates for 1975 by the Bureau of the Census and extrapolations of area-per-capita data developed in the Census of Population for 1960 and 1970.

(2) (1974): Estimates for farmsteads, farm roads, and lanes calculated on the basis of state-by-state number of farms and acreage of unclassified land in farms.

(3) (1974): Includes rural highways and roads. Estimates for highways were derived by applying average right-of-way widths to the mileage in different highway systems reported by the Federal Highway Administration.

(4) (1974): Estimates of acreage in railroad rights-of-way are based on state-by-state changes in mileage reported by the Interstate Commerce Commission. Estimates of acreage in airports is based on information on active airports supplied by the Federal Aviation Administration. Excludes airports used strictly for personal or military use.

(5) (1974): Includes national defense and industrial areas as reported by the Bureau of Land Management. Includes land administered by the Department of Defense for defense purposes (22.9 million acres) and land administered by the Department of Energy (2.1 million acres).

1-14 Specialized Land Uses, 1919-1974 (cont.)

(6) (1974): Includes rural parks and wildlife refuges.

Rural parks encompass areas in National and State parks systems and national forest wilderness and primitive areas plus about 2.7 million acres in New York classified as State forest preserves. Generally excludes parks in urban places and large bodies of water. Based on data from reports and records of the National Park Service, Heritage Conservation and Recreation Service, and individual State agencies.

Wildlife refuges are areas administered by the U.S. Fish and Wildlife Service and State Wildlife agencies. They do not include Federal areas under the primary jurisdication of another agency or areas leased for wildlife purposes. Data on Federal areas are from reports and records of the U.S. Fish and Wildlife Service. State estimates are mainly acreages compiled by the Public Land Law Review Commission plus acreage acquired from 1968-73 through the Dingell-Johnson and Pittman-Robertson programs of Federal assistance.

Sources: U.S. Department of Agriculture, Economics, Statistics, and Cooperatives Service, Major Uses of Land in the United States, Summary for 1974, draft, June, 1978; U.S. Department of Agriculture, Economic Research Service, Major Uses of Land in the United States, Summary for 1969, Agricultural Economic Report No. 247, December 1973; U.S. Department of Agriculture, Economic Research Service, Major Uses of Land and Water in the United States, Summary for 1959, Agricultural Economic Report No. 13, July 1962; U.S. Department of Agriculture, Bureau of Agricultural Economics, Inventory of Major Land Uses, Misc. Pub. No. 663; U.S. Department of Agriculture, Agricultural Research Service, Major Uses of Land in the United States, Summary for 1954, Agricultural Information Bulletin No. 168, January 1957; Gray, Louis, and Baker, O.E., et al., "The Uses of Our Land for Crops, Pasture, and Forest," Yearbook of Agriculture 1923; Wooten, Hugh H., Major Uses of Land in the United States, Department of Agriculture Technical Bulletin No. 1082, December, 1953.

1-15 Urban Regions of the United States, 2000

Urban Region	Urban Land Area (square miles)	Series B Population (1)		Series E Population (2)	
		Pop. in Thousands	Density	Pop. in Thousands	Density
Metropolitan Belt	180,128	132,013	733	109,529	608
Atlantic Seaboard	70,264	69,098	983	57,330	816
Lower Great Lakes	109,864	62,915	573	52,199	475
California Region	54,986	42,211	768	35,022	637
Florida Peninsula	22,195	15,453	696	12,819	578
Gulf Coast	29,736	10,750	362	8,920	300
East Central Texas-Red River	23,436	8,986	383	7,455	318
Southern Piedmont	24,968	6,714	269	5,571	223
Northern Georgia-Southeast Tennessee	12,135	4,668	385	3,873	319
Puget Sound	6,333	4,380	692	3,634	574
Twin Cities Region	16,219	4,355	269	3,614	223
Colorado Piedmont	11,320	3,890	344	3,228	285
St. Louis	5,383	3,578	665	2,969	552
Metropolitan Arizona	12,677	3,532	279	2,930	231
Willamette Valley	9,651	3,110	322	2,580	267
Central Oklahoma-Arkansas Valley	14,974	2,867	191	2,378	159
Missouri-Kaw Valley	5,665	2,497	441	2,072	366
North Alabama	13,052	2,328	178	1,932	148
Bluegrass	5,377	2,167	403	1,798	334
Southern Coastal Plain	7,814	1,891	242	1,569	201
Salt Lake Valley	4,721	1,744	369	1,447	307
Central Illinois	7,682	1,573	205	1,305	170
Nashville Region	6,692	1,401	209	1,162	174
East Tennessee	5,869	1,321	225	1,096	187
Oahu Island	593	1,290	2,180	1,071	1,810
Memphis	1,839	1,264	687	1,048	570
El Paso-Ciudad Juarez (3)	3,457	825	239	685	198
Platte Valley	3,851	1,190	309	(a)	(a)
Las Vegas	4,605	1,175	255	(a)	(a)
East Iowa-Mississippi Valley	5,447	1,145	210	(a)	(a)
United States, Total: Series B	500,805	268,318	536	...	...
United States, Total: Series E	486,902	...	...	219,707	451

(1) Series B is a term used by the U.S. Bureau of the Census for a high projection (1.53%) of growth in population during the period 1970-2000.

(2) Series E is a term used by the U.S. Bureau of the Census for a low projection (.90%) of growth in population during the period 1970-2000.

1-15 Urban Regions of the United States, 2000 (cont.)

(3) Total urban region population in U.S. and Mexico is over 1 million. Other international urban regions contiguous with U.S.: Canadian Metropolitan Belt; Lower Fraser Valley (with Puget Sound); Baja, California (extension of California Urban Region into Mexico).

(a) Series E projection is less than 1 million population.

Sources: Pickard, J. P., "U.S. Metropolitan Growth and Expansion, 1970-2000, with Population Projections," from the Commission on Population Growth and the American Future, Population, Distribution, and Policy, Vol. 5, March, 1972, p. 147.

2

CRITICAL AREAS

2-1 Natural Wetlands in the United States, 1968

Location	Thousands of Acres
Columbia-North Pacific	3,744
California	1,888
Great Basin	1,873
Lower Colorado	36
Upper Colorado	34
Rio Grande	383
Missouri	6,783
Arkansas-White-Red	4,610
Texas-Gulf	2,745
Upper Mississippi	3,112
Lower Mississippi	8,927
Great Lakes	1,607
Ohio	647
Tennessee	207
South Atlantic-Gulf	29,936
North Atlantic	3,395
Souris-Red-Rainy	997
Total, U.S.	70,924

The Department of the Interior, Fish and Wildlife Service, Office of Biological Services, is conducting a National Wetlands Inventory. Aggregated data are not currently available.

Source: Water Information Center, Inc., Water Atlas, 1973, Plate 74, from U.S. Water Resources Council, 1968.

2-2 Wetland Acreage in the United States, Presettlement to 1971
(in millions of acres)

	Presettlement	1906	1922	1953	1971
Total U.S. Wetland Acreage	127	79	91	82	70

Sources: Shaw, Samuel P., and Fredine, C. Gordon, Wetlands of the United States, Fish and Wildlife Circular No. 39, 1953, pp. 6, 7; and Goodwin, Richard H., and Niering, William A., "Inland Wetlands: Their Ecological Role and Environmental Status," Bulletin of the Ecological Society of America, June 1974, Volume 55, No. 2, p. 4.

2-3 State Wetland Acreages, Presettlement to 1975
(in millions of acres)

State	Presettlement	1850	1906	1922	1940	1953	1968	1970	1973	1975
Florida		20.325	19.800	16.846		15.266				
South Florida			6.179			5.709			4.172	
Arkansas		7.687	5.912	4.220		3.749				
Louisiana Coast (1)					4.206		3.911	3.890		
Missouri		3.432	2.440	1.085		.322				
California	3.500	2.193	3.420	1.179		.457				.400

(1) Louisiana Coast data for 1940 and 1970 were estimated using a loss rate of 16.5 square miles a year.

Sources: Shaw, Samuel P., and Fredine, C. Gordon, Wetlands of the United States, Fish and Wildlife Circular No. 39, 1953, p. 7; Florida State Planning Office, Tallahassee, Florida, unpublished data; U.S. Department of Commerce, National Oceanic and Atmospheric Administration, and the Louisiana Wildlife and Fisheries Commission, Cooperative Gulf of Mexico Estuarine Inventory and Study, Louisiana, p. 10; Gagliano, Sherwood M., "Deterioration and Restoration of Coastal Wetlands," from the Proceedings of the Twelfth International Conference on Coastal Engineering, 1970, p. 7; and Sullivan, Peter, "Versatile Wetlands - An Endangered Resource," Conservation News, October 15, 1976, Volume 41, No. 20, p. 5.

2-4 Wetland Acreages in Selected Areas, 1850-1974
(in thousands of acres)

	1850	1930	1954	1959	1964	1968	1971	1974
Delaware			120.1	116.9	115.5			115
Mississippi Coast	76.1	75.1				66.9		
New York, L.I.			34.72	31.12	26.5	22.39	20.06	
Suffolk County, L.I.			20.59	19.21	17	12.93	10.83	
Nassau County, L.I.			14.13	11.91	9.5	9.46	9.23	

Sources: Division of River Basin Studies, U.S. Department of the Interior, Fish and Wildlife Service, Supplementary Report, June 1965, on the Coastal Wetlands Inventory of Delaware, Boston, Mass., June, 1965; Jensen, Kathi, "Search for the Wetlands," Delaware Conservationist, Summer, 1975, p. 16; National Oceanic and Atmospheric Administration, Department of Commerce, and the Mississippi Marine Conservation Commission, Cooperative Gulf of Mexico Estuarine Inventory and Study, Mississippi, 1973, pp. 16, 179, and 180; New York State Planning Services, Long Island Marine Wetlands - Status Value, and Preservation Potentials, 1972, pp. 9, 10.

2-5 Use of Filled Wetlands, Maine to Delaware, 1955-1964

Use	Percent	Acres
Total	100	45,000
Dredged Spoil	34	15,300
Housing	27	12,150
Recreation	15	6,750
Transportation	10	4,500
Industrial	7	3,150
Dumps	6	2,700
Other	1	450

Sources: Clark, John, Fish and Man: Conflict in the Atlantic Estuary, Special Publication No. 5, American Littoral Society, Highlands, New Jersey: 1967; and Environmental Protection Agency, The Economic and Social Importance of Estuaries, April, 1971, p. E-7.

2-6 State Land Use Programs, 1975

State	Coastal Zone Management (1)	Wetlands Management (2)	Designation of Critical Areas (3)	Statewide Shorelands Act (4)
Alabama	X			
Alaska	X			
Arizona				
Arkansas				
California	X			
Colorado			X	
Connecticut	X	X		
Delaware	X	X		X
Florida	X	X	X	
Georgia	X	X		
Hawaii	X		X	
Idaho				
Illinois	X			
Indiana	X			
Iowa				
Kansas				
Kentucky				
Louisiana	X	X		
Maine	X	X	X	
Maryland	X	X	X	
Massachusetts	X	X		
Michigan	X			X
Minnesota	X	X	X	X
Mississippi	X	X		
Missouri		X		
Montana			X	X
Nebraska				
Nevada			X	
New Hampshire	X	X		
New Jersey	X	X		
New Mexico				
New York	X	X	X	
North Carolina	X	X		
North Dakota				
Ohio	X			
Oklahoma				
Oregon	X		X	
Pennsylvania	X	X	X	
Rhode Island	X	X		
South Carolina	X			

2-6 State Land Use Programs, 1975 (cont.)

State	Coastal Zone Management (1)	Wetlands Management (2)	Designation of Critical Areas (3)	Statewide Shorelands Act (4)
South Dakota			X	
Tennessee				
Texas	X	X		
Utah				
Vermont		X		
Virginia	X	X		
Washington	X	X		X
West Virginia				
Wisconsin	X	X	X	
Wyoming				

(1) State is participating in federally funded coastal zone management program authorized by the Coastal Zone Management Act of 1972.

(2) State has authority to plan or review local plans and the ability to control land use in the wetlands.

(3) State has established rules, or is in the process of establishing rules, regulations and guidelines for the identification of areas of critical state concern (e.g., environmentally fragile areas, areas of historical significance).

(4) State has legislation authorizing the regulation of the shorelands of significant bodies of water.

Source: Council on Environmental Quality, Environmental Quality - 1976, pp. 68, 69.

2-7 National Wilderness Preservation System, 1976

State	FS (1)		FWS (2)		NPS (3)		BLM (4)		Totals	
	Areas	Acres	Areas	Acres	Areas	Acres	Areas	Acres	Areas	Acres
Alabama	1	12,646	0	0	0	0	0	0	1	12,646
Alaska	0	0	8	76,235	0	0	0	0	8	76,235
Arizona	8	495,614	0	0	3	131,100	0	0	11	626,714
Arkansas	2	24,256	1	2,600	0	0	0	0	3	26,856
California	20	1,725,250	1	141	5	575,454	0	0	26	2,300,845
Colorado	8	1,050,151	0	0	3	52,730	0	0	11	1,102,881
Connecticut	0	0	0	0	0	0	0	0	0	0
Delaware	0	0	0	0	0	0	0	0	0	0
Florida	1	23,432	9	50,235	0	0	0	0	10	73,667
Georgia	2	32,162	3	362,107	0	0	0	0	5	394,269
Hawaii	0	0	0	0	1	19,270	0	0	1	19,270
Idaho	3	1,289,168	0	0	1	43,243	0	0	4	1,332,411
Illinois	0	0	1	4,050	0	0	0	0	1	4,050
Indiana	0	0	0	0	0	0	0	0	0	0
Iowa	0	0	0	0	0	0	0	0	0	0
Kansas	0	0	0	0	0	0	0	0	0	0
Kentucky	1	4,756	0	0	0	0	0	0	1	4,756
Louisiana	0	0	2	8,300	0	0	0	0	2	8,300
Maine	0	0	1	7,501	0	0	0	0	1	7,501
Maryland	0	0	0	0	0	0	0	0	0	0
Massachusetts	0	0	1	2,340	0	0	0	0	1	2,340
Michigan	0	0	3	25,309	1	131,880	0	0	4	157,189
Minnesota	1	747,840	2	6,138	0	0	0	0	3	753,978
Mississippi	0	0	0	0	0	0	0	0	0	0
Missouri	1	12,315	1	8,000	0	0	0	0	2	20,315
Montana	7	1,795,741	3	64,606	0	0	0	0	10	1,860,347
Nebraska	0	0	1	4,635	0	0	0	0	1	4,635
Nevada	1	64,667	0	0	0	0	0	0	1	64,667
New Hampshire	2	25,552	0	0	0	0	0	0	2	25,552
New Jersey	0	0	2	10,353	0	0	0	0	2	10,353
New Mexico	5	679,436	2	39,350	1	23,267	0	0	8	742,053
New York	0	0	0	0	0	0	0	0	0	0
North Carolina	4	31,469	1	9,000	0	0	0	0	5	40,469
North Dakota	0	0	2	9,732	0	0	0	0	2	9,732
Ohio	0	0	1	85	0	0	0	0	1	85
Oklahoma	0	0	1	8,900	0	0	0	0	1	8,900
Oregon	11	951,923	2	38	0	0	0	0	13	951,961
Pennsylvania	0	0	0	0	0	0	0	0	0	0
Rhode Island	0	0	0	0	0	0	0	0	0	0
South Carolina	1	2,809	1	28,000	0	0	0	0	2	30,809

2-7 National Wilderness Preservation System, 1976 (cont.)

State	FS (1)		FWS (2)		NPS (3)		BLM (4)		Totals	
	Areas	Acres	Areas	Acres	Areas	Acres	Areas	Acres	Areas	Acres
South Dakota	0	0	0	0	1	64,250	0	0	1	64,250
Tennessee	3	8,120	0	0	0	0	0	0	3	8,120
Texas	0	0	0	0	0	0	0	0	0	0
Utah	0	0	0	0	0	0	0	0	0	0
Vermont	2	16,205	0	0	0	0	0	0	2	16,205
Virginia	1	8,703	0	0	1	79,019	0	0	2	87,722
Washington	5	1,388,326	2	534	0	0	0	0	7	1,388,860
West Virginia	2	30,215	0	0	0	0	0	0	2	30,215
Wisconsin	1	6,388	1	29	0	0	0	0	2	6,417
Wyoming	5	2,178,262	0	0	0	0	0	0	5	2,178,262
Dist. of Columbia	0	0	0	0	0	0	0	0	0	0
American Samoa	0	0	0	0	0	0	0	0	0	0
Puerto Rico	0	0	0	0	0	0	0	0	0	0
Virgin Islands	0	0	0	0	0	0	0	0	0	0
Pacific Ocean	0	0	0	0	0	0	0	0	0	0
TOTAL	92	12,605,405	52	728,218	17	1,120,213	0	0	161	14,453,836

(1) U.S. Department of Agriculture, Forest Service.

(2) U.S. Department of the Interior, Fish and Wildlife Service.

(3) U.S. Department of the Interior, National Park Service.

(4) U.S. Department of the Interior, Bureau of Land Management. The 1976 Bureau of Land Management Organic Act includes approximately 100 million acres of BLM lands which are under consideration for Wilderness designation.

Source: U.S. Department of Agriculture, Forest Service, Wilderness Monitoring System, computer printout, August 1, 1977.

2-8 Designated and Proposed Wilderness, 1964-1976
(in millions of acres)

Year	Designated		Proposed/Under Study		Grand Total
	Annual Addition	System Total	Annual Addition	System Total	
1964	9.244	9.244	37	37	46.24
1965	0	9.244	0	37	46.24
1966	0	9.244	0	37	46.24
1967	0	9.244	0	37	46.24
1968	.788	10.032	0	37	47.03
1969	.159	10.191	0	37	47.19
1970	.204	10.395	.21	37.21	47.60
1971	0	10.395	.55	37.76	48.15
1972	.631	11.026	.20	37.96	48.99
1973	0	11.026	0	37.96	48.99
1974	.354	11.380	.62	38.58	49.96
1975	1.336	12.716	.27	38.85	51.57
1976	1.738	14.454	.65	39.50 (a)	53.95

(a) In addition, the 1976 BLM Organic Act includes approximately 100 million acres of BLM lands which are under consideration for Wilderness designation.

Source: U.S. Department of Agriculture, Forest Service, Wilderness Monitoring System, computer printout, August 1, 1977.

2-9 National Wild and Scenic Rivers System, 1978

River	Location	Year Admitted to System	Legal Citation	Administering Agency (1)	Mile by Classification			Total Miles
					Wild	Scenic	Recreational	
Middle Fork Clearwater	Idaho	1968	PL 90-542	FS	54	--	131	185
Eleven Point	Missouri	1968	PL 90-542	FS	--	44.4	--	44.4
Feather	California	1968	PL 90-542	FS	32.9	9.7	65.4	108
Rio Grande	New Mexico	1968	PL 90-542	BLM/FS	51.75	--	1	52.7
	Texas	1978	PL 95-625	NPS	95	96.2	--	191.2
Rogue	Oregon	1968	PL 90-542	BLM/FS	33	7.5	44	84.5
St. Croix	Minn/Wisconsin	1968	PL 90-542	NPS	--	181	19	200
Middle Fork Salmon	Idaho	1968	PL 90-542	FS	103	--	1	104
Wolf	Wisconsin	1968	PL 90-542	NPS	--	23.5	.5	24.0
Allagash	Maine	1970	35 FEDREG 11525	State of Maine	95	--	--	95
Lower St. Croix	Minn/Wisconsin	1972	PL 92-560	NPS and States of Minn/Wisc	--	12	15	27
		1976	41 FEDREG 26236		--	--	25	25
Little Miami	Ohio	1974	39 FEDREG 3979	State of Ohio	--	18	48	66
Chattooga	N.C./S.C./Ga.	1974	PL 93-279	FS	39.8	2.5	14.6	56.9
Snake	Idaho/Oregon	1975	PL 94-199	FS	32.5	34.4	--	66.9
Rapid	Idaho	1975	PL 94-199	FS	24.0	--	--	24.0
Little Beaver	Ohio	1976	41 FEDREG 8518	State of Ohio	--	33	--	33
New	North Carolina	1976	PL 94-407	State of N.C.	--	26.5	--	26.5
Missouri	Montana	1976	PL 94-486	BLM	72	28	59	159
	Neb./S.D.	1978	PL 95-625	COE	--	--	59	59
Flathead	Montana	1976	PL 94-486	NPS/FS	97.9	40.7	80.4	219
Obed	Tennessee	1976	PL 94-486	NPS and State of Tennessee	46.2	--	--	46.2

2-9 National Wild and Scenic Rivers System, 1978 (cont.)

River	Location	Year Admitted to System	Legal Citation	Administering Agency (1)	Mile by Classification			Total Miles
					Wild	Scenic	Recreational	
Pere Marquette	Michigan	1978	PL 95-625	FS	--	66.4	--	66.4
Skagit	Washington	1978	PL 95-625	FS	--	99.0	58.5	157.5
Upper Delaware	N.Y./Pa.	1978	PL 95-625	NPS	--	25.0	50.0	75.0
Middle Delaware	N.Y./Pa./N.J.	1978	PL 95-625	NPS	--	35.0 (a)	--	35.0
North Fork American	California	1978	PL 95-625	BLM/FS	38.3	--	--	38.3
Saint Joe	Idaho	1978	PL 95-625	FS	26.6	--	46.2	72.8
TOTAL					840.95	774.3	702.1	2,317.35

(1) FS Forest Service, U.S. Department of Agriculture.
NPS National Park Service, U.S. Department of the Interior.
BLM Bureau of Land Management, U.S. Department of the Interior.
COE Corps of Engineers, U.S. Department of the Army.

(a) This portion of the Middle Delaware qualifies as scenic but has not yet been classified as scenic.

Sources: Council on Environmental Quality, Environmental Quality - 1976, p. 96; and U.S. Department of the Interior, National Park Service, unpublished data.

2-10 National Wild and Scenic Rivers System, 1968-1978

Year	Annual Addition		Cumulative Total	
	No. of Rivers	Miles	No. of Rivers	Miles
1968	8	788.65	8	788.65
1969	-	-	8	788.65
1970	1	95.0	9	883.65
1971	-	-	9	883.65
1972	1	27.0	10	910.65
1973	1	66.0	11	976.65
1974	1	56.9	12	1033.55
1975	3	123.9	15	1157.45
1976	5	464.7	19 (a)	1622.15
1977	-	-	19 (a)	1622.15
1978	8	659.2	25 (b)	2317.35

(a) Excludes the Lower St. Croix, which was first admitted to the system in 1968.

(b) Excludes the Rio Grande and Missouri, which were first admitted to the system in 1968 and 1976, respectively.

Sources: Council on Environmental Quality, Environmental Quality - 1976 p. 96; and U.S. Department of the Interior, National Park Service, unpublished data.

2-11 The National Park System, 1870-1976 (1)

Year	Classification						Decennial Totals		Cumulative Totals	
	Natural		Historical		Recreational					
	Areas	Acreage	Areas	Acreage	Areas	Acreage	Areas	Acreage	Areas	Acreage
1870-1880	1	2,219,822.70	4	1,017.95	0	-	5	2,220,840.65	5	2,220,840.65
1881-1890	3	1,608,041.16	3	10,361.23	1	1,754.37	7	1,620,156.76	12	3,840,977.41
1891-1900	1	235,404.00	4	9,403.54	0	-	5	244,807.54	17	4,085,804.95
1901-1910	16	3,692,330.23	12	79,306.45	0	-	28	3,771,636.68	45	7,857,441.63
1911-1920	10	5,519,694.38	9	39,643.96	0	-	19	5,559,338.34	64	13,416,779.97
1921-1930	16	4,394,277.94	25	65,431.69	1	6,960.30	42	4,466,669.93	106	17,883,449.90
1931-1940	13	6,149,573.08	27	187,621.42	7	1,679,573.73	47	8,016,768.23	153	25,900,218.13
1941-1950	0	-	18	77,839.91	1	100,059.00	19	177,898.91	172	26,078,117.04
1951-1960	1	14,470.38	14	12,813.14	3	1,253,201.08	18	1,280,484.60	190	27,358,601.64
1961-1970	8	1,098,218.91	36	14,493.54	23	1,277,122.99	67	2,389,835.44	257	29,748,437.08
1971-1976	6	926,461.00	18	22,249.93	11	477,970.19	35	1,426,681.12	292	31,175,118.20
Totals	75	25,858,293.78	170	520,182.75	47	4,796,641.66	292	31,175,118.20	292	31,175,118.20

(1) Yearly totals calculated from earliest year of proclamation and/or authorization.

Sources: Department of the Interior, National Park Service, Index of the National Park System and Affiliated Areas as of January 1, 1975, published, 1975, and, "Updated Addenda of October 22, 1976 for the Index of the National Park System and Affiliated Areas as of January 1, 1975."

2-12 National and State Parks, 1870-1976

Years	National (Cumulative Totals)	
	No. of Areas	Acreage
1870-1880	5	2,220,840.65
1881-1890	12	3,840,997.41
1891-1900	17	4,085,804.95
1901-1910	45	7,857,441.63
1911-1920	64	13,416,779.97
1921-1930	106	17,883,449.90
1931-1940	153	25,900,218.13
1941-1950	172	26,078,117.04
1951-1960	190	27,358,601.64
1961-1970	257	29,748,437.08
1971-1976	292	31,175,118.20

Year	State (Cumulative Totals)	
	No. of Areas	Acreage
1941	1,335	4,259,899
1946	1,531	4,624,365
1950	1,725	4,657,000
1955	2,034	5,086,000
1956	2,100	5,165,125
1958	2,335	5,405,901
1959	2,433	5,680,909
1960	2,664	5,601,542
1961	2,792	5,799,057
1962	2,479	5,763,142
1967	3,202	7,352,322
1970	3,425	8,554,919
1975	3,804	9,837,975

Sources: Department of the Interior, National Park Service, Index of the National Park System and Affiliated Areas as of January 1, 1975, published 1975; and "Updated Addenda of October 22, 1976 for the Index of the National Park System and Affiliated Areas as of January 1, 1975"; National Recreation and Park Association, State Park Statistics - 1970, published 1971, p. 9; Department of Commerce, U.S. Bureau of the Census, Statistical Abstract, 1976 p. 216; and National Recreation and Park Association, State Park Statistics - 1975, p. 28.

2-13 National and State Park Visitation, 1954-1975
(in millions of visitors)

Year	National	State
1954	47.83 (a)	
1955	50.01 (a)	
1956	54.92 (a)	200.71
1957	59.28 (a)	
1958	58.68 (a)	237.33
1959	62.81	255.31
1960	79.23	259.00
1961	86.66	273.48
1962	97.04	284.80
1963	102.71	
1964	111.39	
1965	121.31	
1966	133.08	
1967	139.68	391.06
1968	150.84	
1969	163.99	
1970	172.00	482.54
1971	200.54	
1972	211.62	
1973	215.58	
1974	217.44	
1975	238.85	565.71

(a) Does not include visits to the National Capital Park System.

Sources:
State Parks: National Recreation and Park Association, State Park Statistics 1970, published 1971, p. 9; and National Recreation and Park Association, State Park Statistics 1975, p. 27.
National Parks: Department of the Interior, National Park Service, Public Use of the National Parks: A Statistical Report, 1954-1964, published 1966, p. 4; Department of the Interior, National Park Service, Public Use of the National Parks: A Statistical Report, 1960-1970, published 1971, p. 5; Department of the Interior, National Park Service, Public Use of the National Parks, December, 1972, published 1972, p. 9; Department of the Interior, National Park Service, Public Use of the National Park System, Calendar Year Report 1973, published 1974, p. 6; and Department of the Interior, National Park Service, Public Use of the National Park System, Calendar Year Report 1975, published 1976, p. 23.

2-14 Overnight Stays in National Park Service Operated Campgrounds, 1960-1975

Year	Overnight Stays (in thousands)			Number of Campsites (1) (Types A and B)	Number of Areas Reporting
	Tents	Recreation Vehicles	Total		
1960	3,585.5	1,260.2	4,845.7	N.A.	73
1961	3,586.7	1,473.2	5,059.9	19,163	70
1962	4,307.4	1,811.6	6,119.1	21,272	71
1963	4,621.2	2,149.5	6,770.7	24,524	73
1964	5,043.8	2,413.8	7,457.6	27,459	75
1965	5,104.4	2,980.5	8,084.8	27,014	80
1966	5,062.1	3,938.3	9,000.5	28,495	81
1967	4,715.3	4,594.3	9,309.7	28,526	90
1968	4,788.1	4,623.0	9,411.1	28,426	88
1969	4,390.1	4,659.1	9,049.2	27,061	85
1970	4,684.6	4,339.3	9,023.8	27,648	87
1971	3,482.5	4,451.7	7,934.3	27,700	86
1972	3,651.6	4,731.4	8,383.0	27,568 (a)	88
1973	3,801.8	4,883.3	8,685.1	29,489	90
1974	3,791.5	4,620.3	8,411.8	29,241	89
1975	3,735.3	5,081.7	8,817.0	28,987	89

N.A. - Not Available.

(1) The exact number of campsites is not accurately known; there are significant discrepancies in the numbers reported for different purposes by many areas. Type A Campsites are designated to accommodate individuals, families, or small parties and include parking spaces, fireplaces or grills, and tables, and benches. Type B Campsites are areas (other than a campground) designated and used for camping.

(a) An additional 2,073 sites were unidentified by type; some or all may have been type A or B.

Source: Department of the Interior, Natonal Park Service, Public Use of the National Park System, Calendar Year Report 1975, published 1976, p. 26.

2-15 The Ten Most Popular National Parks, 1975

National Park	Number of Recreational Visits (in thousands)
Great Smoky Mountains Tenn./N.C.	8,541
Rocky Mountain, Colorado	2,842
Grand Canyon, Arizona	2,625
Yosemite, California	2,537
Shenandoah, Virginia	2,421
Acadia, Maine	2,380
Olympic, Washington	2,289
Yellowstone, Wyoming	2,239
Grand Teton, Wyoming	2,173
Mammoth Cave, Kentucky	1,681

Source: Department of the Interior, National Park Service, Public Use of the National Park System, Calendar Year Report 1975, published 1976.

2-16 Historic Properties (1) on the National Register of Historic Places, 1968-1977

Year	Annual Addition	Cumulative Total
1968	6	6
1969	359	365
1970	832	1,197
1971	1,026	2,223
1972	1,533	3,756
1973	2,162	5,918
1974	2,151	8,069
1975	1,987	10,056
1976	2,057	12,113
1977	1,516	13,629

(1) Includes districts, sites, structures, buildings and objects.

Source: Department of the Interior, Heritage Conservation and Recreation Service, unpublished data.

2-17 Large Urban Places with Flood Problems, 1970

1970 Population Size	No. of Places with Flood Problems (1)	No. of Places with Flash Flood Problems (2)
2,500--4,999	1,111	76
5,000--9,999	1,015	96
10,000--24,999	924	97
25,000--49,999	397	55
50,000--99,999	204	31
100,000--249,999	88	27
250,000--499,999	30	14
500,000--999,999	16	8
>1,000,000	6	3
Total-All Places (3)	3,791	407

(1) From the most recent (1967) Federal list of urban places with flood problems, including storm drainage.

(2) From the Preliminary (1971) National Weather Service list.

(3) Details may not add to total.

Source: White, Gilbert F., Flood Hazard in the United States: A Research Assessment, Institute of Behavioral Science, The University of Colorado, 1975, p. 5.

2-18 Property Damage and Lives Lost in Major U.S. Earthquakes (including tsunamis), 1811-1971

Year	Locality	Damage ($M)	Constant Dollars ($M) (1)	No. of Lives Lost
1811	New Madrid, Missouri			Several
1812	New Madrid, Missouri			Several
1812	San Juan Capistrano, California			40
1865	San Francisco, California	.5	.7	
1868	San Francisco, California	.4	.7	
1868	Hayward, California			30
1872	Owens Valley, California	.3	.6	27
1886	Charleston, South Carolina	23.0	73.8	60
1892	Vacaville, California	.2	.7	
1898	Mare Island, California	1.4	5.3	
1899	San Jacinto, California			6
1906	San Francisco, California	24.0	71.1	700
1906	San Francisco, California (due to fire loss)	500.0	1,481.9	
1915	Imperial Valley, California	.9	2.4	6
1918	Puerto Rico (tsunami damage from earthquake in Mona Passage)	4.0	5.6	116
1918	San Jacinto and Hemet, California	.2	.3	
1925	Santa Barbara, California	8.0	14.1	13
1926	Santa Barbara, California			1
1932	Humboldt County, California			1
1933	Long Beach, California	40.0	111.2	115
1934	Kosmo, Utah			2
1935	Helena, Montana	4.0	9.1	4
1940	Imperial Valley, California	6.0	14.0	9
1941	Santa Barbara, California	.1	.2	
1941	Torrance-Gardena, California	1.0	2.1	
1944	Cornwall, Canada-Massena, New York	2.0	3.5	
1946	Hawaii (tsunami damage from earthquake in Aleutians)	25.0	37.8	173
1949	Puget Sound, Washington	25.0	29.9	8
1949	Terminal Island, California (due to oil wells only)	9.0	10.8	
1951	Terminal Island, California (due to oil wells only)	3.0	3.1	
1952	Kern County, California	60.0	63.8	14
1954	Eureka-Arcata, California	2.1	2.3	1
1954	Wilkes-Barre, Pennsylvania	1.0	1.1	
1955	Terminal Island, California (due to oil wells only)	3.0	3.0	
1955	Oakland-Walnut Creek, California	1.0	1.0	1

2-18 Property Damage and Lives Lost in Major U.S. Earthquakes (including tsunamis), 1811-1971 (cont.)

Year	Locality	Damage ($M)	Constant Dollars ($M) (1)	No. of Lives Lost
1957	Hawaii (due to tsunami damage from earthquake in Aleutians)	3.0		
1957	San Francisco, California	1.0		
1958	Khantaak Island and Lituya Bay, Alaska			5
1959	Hebgen Lake, Montana (damage to timber and roads)	11.0	10.9	28
1960	Hawaii and U.S. West Coast (due to tsunami damage to Hilo from earthquake off Chile coast)	25.5	25.3	61
1961	Terminal Island, California (due to oil wells only)	4.5	4.5	
1962	Utah	1.0		
1964	Alaska and U.S. West Coast (includes tsunami damage from earthquake near Anchorage)	500.0	497.5	131
1965	Puget Sound, Washington	12.5	12.2	7
1966	Dulce, New Mexico	.2	.2	
1969	Santa Rosa, California	6.3	5.6	
1971	San Fernando, California	553.0	474.3	65

(1) Constant Dollars (millions): 1957-1959 = 100.

Source: Ayre, Robert S., Earthquake and Tsunami Hazards in the United States: A Research Assessment, Institute of Behavioral Science, The University of Colorado, 1975, Table I-2, p. 27.

2-19 Loss of Life Due to Hurricanes, Floods, Tornadoes, and Earthquakes, 1900-1975

Years	Hurricanes (2)		Floods (3)		Tornadoes (4)		Earthquakes (5)		Total		
	Total Lives Lost	Average Annual Deaths per 10 Mil.	Total Lives Lost	Average Annual Deaths per 10 Mil.	Total Lives Lost	Average Annual Deaths per 10 Mil.	Total Lives Lost	Average Annual Deaths per 10 Mil.	Total Lives Lost	Average Annual Pop. in Millions	Average Annual Deaths per 10 Mil.
1900-1904(1)	19	1.2								79.1	
1905-1909(1)	689	39.1					700	16.1		87.1	
1910-1914(1)	42	1.5								95.6	
1915-1919(1)	1,033	20.1			1,000	24.2	122	2.4		102.7	
1920-1924(1)	9	(a)			1,320	24.0				110.2	
1925-1929	2,114	35.6	579	9.7	1,944	32.7	14	.2	4,651	118.9	.2
1930-1934	80	1.3	146	2.3	1,018	16.3	118	1.9	1,361	124.8	21.8
1935-1939	1,026	15.9	783	12.1	921	14.3	4	.1	2,734	129.0	42.4
1940-1944	149	2.2	315	4.7	835	12.5	9	.1	1,308	133.2	19.6
1945-1949	67	.9	304	4.3	953	13.4	181	2.5	1,505	142.1	21.2
1950-1954	217	2.8	293	3.8	885	11.4	15	.2	1,410	155.9	18.1
1955-1959	660	7.7	498	5.8	523	6.1	34	.4	1,715	170.4	20.1
1960-1964	175	1.9	242	2.6	230	2.5	192	2.1	839	185.7	9.0
1965-1969	412	4.2	512	5.2	710	7.2	7	.1	1,641	197.5	16.6
1970-1974	146	1.4	943	9.1	704	6.8	65	.6	1,858	207.9	17.9
1975	21	1.0	114(b)	5.4	60	2.8				213.0	

Average Annual deaths per 10 million population is calculated according to a ratio of the years reported and the average annual resident population for those years.

(1) Data for lives lost between 1900-1924 are for selected years. Years reported for hurricanes include 1901, 1903, 1906, 1909, 1912, and 1915-1924. Years reported for tornadoes include 1916-1924. Years reported for earthquakes include 1906, 1915, and 1918.

(2) Hurricane data include North Atlantic tropical cyclones. Tropical cyclone is a general term for storms that form in the tropics. Tropical cyclones have winds of 39 to 73 mph while hurricanes have maximum winds of 74 mph or higher. These winds are accompanied by heavy rains, high waves, and tides.

(3) Floods are a rising and overflowing of a body of water that covers land not usually under water.

(4) Tornadoes are local storms of short duration formed of winds rotating at very high speeds, usually in a counter-clockwise direction. These storms are visible as a vortex, a whirlpool structure of winds rotating about a hollow cavity in which contrifugal forces produce a partial vacuum. The fall in barometric pressure is so rapid that wooden structures are often lifted and burst open by the air confined within them.

2-19 Loss of Life Due to Hurricanes, Floods, Tornadoes, and Earthquakes, 1900-1975 (cont.)

(5) Earthquake data include tsunamis. Earthquakes are a shaking or trembling of the earth that accompany crustal movements such as mountain building. Their intensity is measured on a Richter scale, with the measurements increasing geometrically.

(a) Less than .05.

(b) Estimated.

Sources:
1900-1924: (Hurricanes, Tornadoes): U.S. Bureau of the Census, Historical Statistics, Colonial Times to 1970, p. 448.
1905-1975: (Earthquakes): Ayre, Robert S., Earthquake and Tsunami Hazards in the United States: A Research Assessment, Institute of Behavioral Science, the University of Colorado, 1975, Table I-2, p. 27.
1925-1964: (Hurricanes, Floods, and Tornadoes): Brinkmann, Waltraub, A.R., Hurricane Hazards in the United States: A Research Assessment, Institute of Behavioral Science, the University of Colorado, 1975, p. 22.
1965-1969: (Hurricanes, Floods, and Tornadoes): U.S. Bureau of the Census, Historical Statistics, Colonial Times to 1970, p. 448.
1970-1975: (Hurricanes, Floods, and Tornadoes): U.S. Bureau of the Census, Statistical Abstract, 1977, Table 350, p. 207.
1900-1969: Population U.S. Bureau of the Census, Historical Statistics, Colonial Times to 1970, p. 8.
1970-1975: Population U.S. Bureau of the Census, Statistical Abstract, 1976, p. 5.

2-20 Property Damage Due to Hurricanes, Floods, Tornadoes and Earthquakes, 1905-1975
(in 1958 constant dollars)

Years	GNP (average annual billion dollars)	Hurricanes		Floods		Tornadoes		Earthquakes		Total		
		Total Mil. $ Loss	Average Annual Loss Per 10 Bil. GNP	Total Mil. $ Loss	Average Annual Loss Per 10 Bil. GNP	Total Mil. $ Loss	Average Annual Loss Per 10 Bil. GNP	Total Mil. $ Loss	Average Annual Loss Per 10 Bil. GNP	Total Mil. $ Loss	Total In '64 Prices (1)	Average Annual Loss Per 10 Bil. GNP
1905-1909								71.1(a)				
1915-1919								8.3(b)				
1925-1929	190.7	133	1.39	494	5.18	95	1.00	8	.08	730	1,550	7.66
1930-1934	158.6	51	.64	76	.96	44	.55	40	.50	211	563	2.66
1935-1939	193.6	314	3.24	965	9.97	39	.40	4	.04	1,322	3,327	13.66
1940-1944	297.4	222	1.49	479	3.22	60	.40	7	.05	768	1,537	5.16
1945-1949	325.1	298	1.83	833	5.12	126	.78	34	.21	1,291	1,953	7.94
1950-1954	390.7	802	4.11	1,688	8.64	331	1.69	65	.33	2,886	3,619	14.77
1955-1959	452.0	539	2.39	1,780	7.88	209	.92	16	.07	2,544	2,842	11.26
1960-1964	529.4	1,576	5.95	1,152	4.35	207	.78	405	1.53	3,340	3,409	12.62
1965-1969	676.7	2,400	7.09	2,522	7.45							
1970-1974				5,321								
1975				1,051(c)								

(1) GNP implicit price deflator was used to obtain these estimates; from 1928 to 1929, a linked wholesale price index was used.

(a) Year included is 1906.

(b) Years included are 1915 and 1918.

(c) Estimated.

Sources:
GNP:
1925-1939: Department of Commerce, Social and Economic Statistics Administration, Bureau of Economic Analysis, Long Term Economic Growth, 1860-1970, p. 166, A2.
1940-1969: Economic Report of the President, transmitted to Congress, February, 1974, p. 250.
Hazards:
1905-1919: (Earthquakes): Ayre, Robert S., Earthquake and Tsunami Hazards in the United States: A Research Assessment, Institute of Behavioral Science, the University of Colorado, 1975, Table I-2, p. 27.
1925-1964: (Hurricanes, Tornadoes, and Earthquakes): Brinkmann, Waltraub, A.R., Hurricane Hazards in the United States: A Research Assessment, Institute of Behavioral Science, the University of Colorado, 1975, Table III-1, p. 22.
1925-1969: (Floods): U.S. Bureau of the Census, Historical Statistics of the United States, Colonial Times to 1970, Series J 275, p. 448.
1970-1975: (Floods): U.S. Bureau of the Census, Statistical Abstract, 1977, Table 350, p. 207.

HUMAN SETTLEMENTS

3-1 Housing Units and Population in the United States, 1900-1975

Year	Housing Units (millions)		Resident Population (millions)	Occupied Housing Units Per 100,000 Population
	Occupied	Total (1) Including Unoccupied		
1900	16.0	N.A.	76.0	21,053
1910	20.3	N.A.	92.4	21,970
1920	24.4	N.A.	106.4	22,932
1930	29.9	N.A.	123.1	24,289
1940	34.9	37.3	132.4	26,360
1950	42.8	46.0	151.9	28,176
1960	53.0	58.3	180.0	29,444
1970	63.4	68.7	203.8	31,109
1975	72.5	79.1	213.0	34,038

N.A. - Not Available.

(1) Includes vacant, both seasonal and migratory.

Sources: U.S. Bureau of the Census, Statistical Abstract, 1976, Table 2 and Table 1273; U.S. Bureau of the Census, Historical Statistics of the United States, Colonial Times to 1970, p. 646; U.S. Bureau of the Census and Department of Housing and Urban Development, Annual Housing Survey, 1975, Part A, p. 1 and Part B, p. 1.

3-2 Composition of Housing Stock, 1940-1976

Year	Single-family Units (1)		Mobile Homes, Trailers		Multifamily Units (2)		Total	
	%	Thousands	%	Thousands	%	Thousands	%	Thousands
1940	71.2	26,566	.4	167(a)	28.4	10,593	100	37,325
1950	69.4	31,914	.7	315	29.9	13,754	100	45,983
1960	75.0	43,759	1.3	767	23.6	13,790	100	58,315
1970	69.1	46,791	3.1	2,073	27.8	18,836	100	67,699
1974	67.6	51,284	4.9	3,715	27.5	20,887	100	75,886
1975	67.9	52,618	4.3	3,342	27.8	21,594	100	77,553
1976	68.0	53,611	4.6	3,627	27.8	22,077	100	79,316

(1) Single-family units are primarily detached houses. This category also includes townhouses attached in groups of two or more which are partitioned from each other by an unbroken ground to roof wall (no common attic or basement) and in which each unit has its own separate utilities.

(2) Multifamily units consist of two or more attached units which share utilities (such as plumbing) and have no roof to basement wall separating them.

(a) Also includes tourist cabins, boats, etc.

Sources:
1940: U.S. Bureau of the Census, U.S. Census of Housing, Vol. II, Part 1, Table 4.
1950: U.S. Bureau of the Census, U.S. Census of Housing, Vol. I, Part 1, Table 5.
1960: U.S. Bureau of the Census, U.S. Census of Housing, Vol. I, Part 1, Table 5.
1970, 1974-1976: U.S. Bureau of the Census and Department of Housing and Urban Development: Annual Housing Survey, 1976, Part A, p. 1, and previous annual issues.

3-3 Housing Units Authorized by Building Permits, Total U.S., 1963-1977

Year	Single Family Units		Multifamily Units		Total Housing Units	
	Percent of Total	Number	Percent of Total	Number	Percent of Total	Number
1963	56	750,243	44	584,441	100	1,334,684
1964	56	720,107	44	565,711	100	1,285,818
1965	57	709,900	43	530,650	100	1,240,550
1966	58	563,203	42	408,742	100	971,945
1967	57	650,550	43	490,482	100	1,141,032
1968	51	694,696	49	658,701	100	1,353,397
1969	47	624,767	53	697,562	100	1,322,329
1970	48	646,767	52	704,767	100	1,351,534
1971	47	906,075	53	1,018,550	100	1,924,625
1972	47	1,033,127	53	1,185,795	100	2,218,922
1973	48	882,058	52	937,477	100	1,819,535
1974	60	643,763	40	430,603	100	1,074,366
1975	72	675,480	28	263,679	100	939,159
1976	69	893,581	31	402,592	100	1,296,173
1977	67	1,126,079	33	563,945	100	1,690,024

Data on housing units refer to those that are privately owned and permit authorized. Note that building permits data are not equivalent to housing starts. Starts in building permit-issuing places account for approximately 85% of total starts. The 15% starts in nonpermit places are overwhelmingly single-family.

Sources: U.S. Bureau of the Census, Housing Authorized by Building Permits and Public Contracts, Construction Report C40-77-13, and previous annual issues.

3-4 Housing Units Authorized by Building Permits In SMSA's Inside Central Cities, 1963-1977

Year	Single Family Units		Multifamily Units		Total	
	%	Number	%	Number	%	Number
1963	35.7	145,145	64.3	261,052	100	406,197
1964	36.1	137,003	63.9	242,580	100	379,583
1965	38.4	131,079	61.6	210,202	100	341,281
1966	37.8	99,776	62.2	164,095	100	263,871
1967	37.0	113,841	63.0	193,726	100	307,567
1968	30.3	120,652	69.7	277,068	100	397,720
1969	28.1	108,731	71.9	277,721	100	386,452
1970	29.6	123,451	70.4	293,635	100	417,086
1971	30.8	179,087	69.2	402,040	100	581,127
1972	28.0	167,778	72.0	431,161	100	598,939
1973	27.6	126,745	72.4	332,976	100	459,721
1974	36.1	91,105	63.9	161,448	100	252,553
1975	51.4	105,060	48.6	99,352	100	204,412
1976	46.5	141,521	53.5	162,637	100	304,158
1977	44.9	181,157	55.1	222,652	100	403,809

Data on housing units refer to those that are privately owned and permit authorized.

Source: U.S. Bureau of the Census, Housing Authorized by Building Permits and Public Contracts, Construction Report C40-77-13, and previous annual issues.

3-5 Housing Units Authorized by Building Permits In SMSA's Outside Central Cities, 1963-1977

Year	Single Family Units		Multifamily Units		Total	
	%	Number	%	Number	%	Number
1963	60.0	403,081	40.0	269,302	100	672,383
1964	60.4	395,559	39.6	259,276	100	654,835
1965	60.8	396,185	39.2	255,609	100	651,794
1966	61.4	313,861	38.6	197,432	100	511,293
1967	60.5	369,140	39.5	241,306	100	610,446
1968	56.6	400,081	43.4	306,823	100	706,904
1969	51.0	350,818	49.0	336,860	100	687,678
1970	51.8	337,087	48.2	313,407	100	650,494
1971	50.4	512,208	49.6	504,288	100	1,016,496
1972	49.2	590,499	50.8	608,572	100	1,199,071
1973	52.3	535,299	47.7	488,514	100	1,023,813
1974	64.0	372,914	36.0	209,520	100	582,434
1975	77.3	386,083	22.7	113,561	100	499,644
1976	75.7	528,517	24.2	169,253	100	697,770
1977	73.2	675,718	26.8	246,814	100	922,532

Data on housing units refer to those that are privately owned and permit authorized.

Source: U.S. Bureau of the Census, Housing Authorized by Building Permits and Public Contracts, Construction Report C40-77-13 and previous annual issues.

3-6 Housing Units Authorized by Building Permits Outside SMSA's, 1963-1977

Year	Single Family Units		Multifamily Units		Total	
	%	Number	%	Number	%	Number
1963	78.9	202,017	21.1	54,087	100	256,104
1964	74.6	187,545	25.4	63,855	100	251,400
1965	73.8	182,636	26.2	64,839	100	247,475
1966	76.0	149,566	24.0	47,215	100	196,781
1967	75.1	167,569	24.9	55,450	100	223,019
1968	69.9	173,963	30.1	74,810	100	248,773
1969	66.6	165,218	33.4	82,981	100	248,199
1970	65.6	186,229	34.4	97,725	100	283,954
1971	65.7	214,780	34.3	112,222	100	327,002
1972	65.3	274,850	34.7	146,062	100	420,912
1973	65.5	220,014	34.5	115,987	100	336,001
1974	75.1	179,744	24.9	59,635	100	239,379
1975	78.4	184,337	21.6	50,766	100	235,103
1976	76.0	223,543	24.0	70,702	100	294,245
1977	74.0	269,204	26.0	94,479	100	363,683

Data on housing units refer to those that are privately owned and permit authorized.

Source: U.S. Bureau of the Census, Housing Authorized by Building Permits and Public Contracts, Construction Report C40-77-13 and previous annual issues.

3-7 Mobile Home Shipments, 1963-1977

Year	Mobile Homes Shipped to Dealers (thousands)	New Single Family Housing Units Started (thousands)	Total Single Units (thousands)	Mobile Homes Shipped as a Percent of Total Single Units Started and Mobile Homes Shipped
1963	151	1,013.4	1,164.4	13.0
1964	191	971.9	1,162.9	16.4
1965	216	964.9	1,180.9	18.3
1966	217	779.5	996.5	21.8
1967	240	844.9	1,084.9	22.1
1968	318	900.4	1,218.4	26.1
1969	413	811.2	1,224.2	33.7
1970	401	815.2	1,216.2	33.0
1971	497	1,152.9	1,649.9	30.1
1972	576	1,310.7	1,886.7	30.5
1973	567	1,133.2	1,700.2	33.4
1974	329	889.1	1,218.1	27.0
1975	213	895.5	1,108.5	19.2
1976	246	1,166.4	1,412.4	17.4
1977	277	1,450.9	1,727.9	16.0

Sources: U.S. Bureau of the Census, Statistical Abstract, 1976, p. 739; U.S. Bureau of the Census, Housing Starts, Construction Report C20-77-3, pp. 3, 11; U.S. Bureau of the Census, Housing Starts, Construction Report C20-78-8, pp. 3, 8; and U.S. Bureau of the Census, Historical Statistics, Colonial Times to 1970, p. 640.

3-8 Age of Housing by Year Built, 1940-1975

Year	Built 1939 & Earlier		Built 1940-1949		Built 1950-1959		Built 1960-1969		Built 1970-1975		Total-Occupied & Vacant	
	%	thousands	%	thousands	%	thousands	%	thousands	%	thousands	%	thousands
1940	100.0	37,325										
1950(1)	79.3	36,446	20.7	9,537							100	37,325
1960	57.7	33,632	14.8	8,640	27.5	16,046					100	45,983
1970(2)	40.6	27,458	13.0	8,786	21.4	14,499	25.0	16,956			100	58,318
1975(2)	34.7	26,877	10.3	7,974	17.5	13,600	23.1	17,891	14.5	11,212	100	68,672
											100	77,553

(1) 1950 data derived from a ratio of occupied units to total units.

(2) Includes all year-round housing units. Excludes vacant, seasonal, and migratory.

Sources:
1940, 1950: U.S. Bureau of the Census, unpublished data.
1960: U.S. Bureau of the Census, Statistical Abstract, 1976, p. 744.
1970: U.S. Bureau of the Census, 1970 Census of Housing, Detailed Housing Characteristics, HC(1)-B1, U.S. Summary, pp. 1-242.
1975: U.S. Bureau of the Census and Department of Housing and Urban Development, Annual Housing Survey, 1975, Part A, p. 1.

3-9 Condition of Housing, 1940-1975
(in percentage of households)

Condition	1940	1950	1960	1970	1975
Lacking Complete Plumbing (1)	44.6	35.4	16.8	6.9	2.9
Crowded (2)	20.2	15.8	11.5	8.2	5.0
Dilapidated (3)	18.1	9.8	5.0	4.5	N.A.

N.A. - Not Available.

(1) Lacking complete plumbing: (1940): Lacking some or all basic plumbing facilities - private bath, private flush toilet, running water; (1950-1970): Lacking one or more plumbing facilities or having a facility used also by occupants of another unit; (1975): Lacking some or all plumbing facilities.

(2) Crowded: (all years): More than one person per room.

(3) Dilapidated: (1940): Needing major repair - defined as a unit having serious defects requiring repair or replacement or a unit for which continued neglect would jeopardize soundness of structure or safety of occupants; (1950-1970): Housing which does not provide safe and adequate shelter and endangers health, safety or well-being of occupants. Defects are so critical or widespread that the structure should be extensively repaired, rebuilt, or torn down; (1975): Not measured.

Sources:
1940: U.S. Bureau of the Census, Census of Housing, 1940, Vol. 11, Part 1, from OMB, Social Indicators, 1973, pp. 206, 209.
1950-1970: U.S. Bureau of the Census, Census of Housing, 1950, 1960, and 1970, from Department of Housing and Urban Development, Housing in the Seventies, 1973, p. 6-4.
1975: U.S. Bureau of the Census and Department of Housing and Urban Development, Annual Housing Survey: 1975, Part A, p. 4, and Part B, p. 3.

3-10 Size of New Single Family Housing, 1966-1977

Year	Size of House (median square feet)
1966	1525
1967	1570
1968	1605
1969	1585
1970	1400
1971	1415
1972	1460
1973	1540
1974	1565
1975	1560
1976	1620
1977	1630

Data are for new single family houses sold, including townhouses.

Sources:
1966-1970: U.S. Bureau of the Census and Department of Housing and Urban Development, Characteristics of New One-Family Homes: 1974, Construction Report C25-74-13, 1975, p. 103.
1971-1975: U.S. Bureau of the Census and Department of Housing and Urban Development, Characteristics of New Housing, Construction Report C25-75-13, 1976, p. 54.
1976-1977: U.S. Bureau of the Census and Department of Housing and Urban Development, Characteristics of New Housing: 1977, Construction Report C25-77-13, p. 58.

3-11 Characteristics of New Single Family Housing, 1966-1977
(in percentage of units) (1)

Year	Garage	Two or More Baths	Central Air Conditioning	Full or Partial Basement	Electric Heat	Two or More Stories Plus Split Level	Fireplace
1966	64	50	25	44	20	28	
1967	65	52	28	44	20	29	
1968	66	54	31	43	22	30	
1969	65	56	36	42	25	30	45
1970	58	48	34	37	28	27	35
1971	57	48	36	36	31	27	36
1972	61	53	43	37	36	25	38
1973	65	60	49	41	42	33	44
1974	68	61	48	45	49	35	49
1975	67	60	46	45	49	35	53
1976	72	67	49	45	48	37	58
1977	73	69	54	44	50	37	61

1966-1970: Homes sold and contractor built, owner-built, and rental homes started.

1971-1977: Privately owned single family houses completed.

(1) Percents exclude houses for which characteristics specified were not reported.

Sources:
1966-1971: U.S. Bureau of the Census and Department of Housing and Urban Development, Characteristics of New One-Family Homes: 1974, Construction Report C25-74-13, 1975, pp. 33, 39, 45, 51, 57, 75, 81.
1972-1977: U.S. Bureau of the Census and Department of Housing and Urban Development, Characteristics of New Housing: 1977, Construction Report C25-77-13, pp. 34, 42, 43.

3-12 Size and Characteristics of New Multifamily Housing Units, 1971-1977
(in percentage of units, except as indicated)

Year	Size of Floor Area (median square feet)
1971	887
1972	892
1973	892
1974	922
1975	942
1976	894
1977	881

Year	Air Conditioning	Electric Heat	Two or More Bathrooms	Four or More Floors
1971				16
1972				15
1973				16
1974	86	60	24	16
1975	85	59	24	23
1976	75	59	19	14
1977	80	66	20	8

Includes privately owned multifamily housing units completed.

Sources:
1971-1973: U.S. Bureau of the Census and Department of Housing and Urban Development, Characteristics of New Housing, Construction Report C25-75-13, Table 17, pp. 42-44.
1974-1977: U.S. Department of Commerce and Department of Housing and Urban Development, Characteristics of New Housing: 1977, Construction Report C25-77-13, pp. 48-50.

3-13 Homes With Selected Electrical Appliances, 1960-1976

Item	Homes With Appliances (millions)						Percent With Appliances					
	1960	1965	1970	1974	1975	1976	1960	1965	1970	1974	1975	1976
Number of wired homes	51.7	57.6	64.0	70.9	72.7	74.1	(a)	(a)	(a)	(a)	(a)	(a)
Air-conditioners, room	7.8	13.9	26.0	36.6	38.4	40.3	15.1	24.2	40.6	51.6	52.8	54.4
Dishwashers	3.7	7.8	17.0	26.0	27.9	29.4	7.1	13.5	26.5	36.6	38.3	39.6
Disposers, food waste	5.4	7.8	16.3	26.4	28.2	30.2	10.5	13.6	25.5	37.2	38.8	40.7
Dryers, clothes (incl. gas)	10.1	15.2	28.6	40.1	42.0	43.4	19.6	26.4	44.6	56.5	57.7	58.6
Freezers, home	12.1	15.7	20.0	29.6	31.6	32.9	23.4	27.2	31.2	41.7	43.5	44.4
Microwave ovens	N.A.	N.A.	N.A.	1.6	2.3	3.4	N.A.	N.A.	N.A.	2.2	3.2	5.1
Ranges: Free-standing	16.0	18.5	25.9	34.6	35.8	37.4	30.9	32.1	40.5	48.8	49.2	50.4
Built-in	3.3	5.9	9.6	13.3	14.0	14.6	6.4	10.3	15.0	18.8	19.3	19.7
Refrigerators	50.8	57.3	68.9	70.8	72.6	73.9	98.2	99.5	99.8	99.9	99.9	99.8
Television: Black and white	46.2	55.9	63.2	70.8	72.6	74.0	89.4	97.1	98.7	99.9	99.9	99.9
Color	N.A.	5.5	27.2	50.7	54.1	57.5	N.A.	9.5	42.5	71.5	74.4	77.7
Washers, clothes	28.6	33.1	39.8	48.5	50.8	53.7	55.4	57.4	62.1	68.4	69.9	72.5
Water heaters	9.8	13.5	20.2	28.2	29.4	30.9	18.9	23.4	31.6	39.8	40.4	41.7

As of December 31, percentages based on total number of homes wired for electricity.

N.A. - Not Available.

(a) Not applicable.

Source: U.S. Bureau of the Census, Statistical Abstract, 1977, Table 1344, p. 784.

3-14 Overall Opinion of Living Unit, 1974-1976
(in percentages)

Opinion	1974	1975	1976
Owner and Renter Occupied Units:			
Excellent	35.3	34.4	34.0
Good	45.7	47.5	47.7
Fair	15.3	15.0	15.4
Poor	3.3	2.7	2.8

Totals are less than 100% due to rounding and opinions not reported.

Sources: U.S. Bureau of Census, Annual Housing Survey, Part B, annual issues, pp. 6, 7.

3-15 Overall Opinion of Living Unit, 1975
(in percentages)

Opinion	United States Total	Inside SMSA's			Outside SMSA's
		Total	In Central Cities	Not In Central Cities	
Owner and Renter Occupied:					
Excellent	34.4	35.0	28.8	40.3	32.8
Good	47.5	47.0	47.6	46.4	48.5
Fair	15.0	14.6	18.7	11.1	15.8
Poor	2.7	2.8	4.2	1.7	2.5
Owner Occupied:					
Excellent	42.3	44.5	39.8	47.3	38.3
Good	46.9	46.1	48.6	44.7	48.2
Fair	9.5	8.3	10.3	7.1	11.9
Poor	.9	.7	.8	.6	1.2
Renter Occupied:					
Excellent	19.8	20.2	18.0	23.3	18.6
Good	48.6	48.3	46.7	50.6	49.4
Fair	25.0	24.6	27.0	21.1	25.9
Poor	6.1	6.2	7.4	4.4	5.8

Totals are less than 100% due to rounding and opinions not reported.

Source: U.S. Bureau of the Census and Department of Housing and Urban Development, Annual Housing Survey, 1975, Part B, p. 7.

3-16 Opinion of Neighborhood Deficiencies, 1973-1976
(in percentages)

Deficiency	1973	1974	1975	1976
Noise	45.7	49.2	50.9	52.6
Heavy Traffic	28.9	31.4	30.2	30.4
Inadequate Street Lights	19.9	21.0	25.0	24.4
Streets in Need of Repair	14.1	19.4	17.1	17.5
Crime	13.2	17.1	18.4	17.8
Commercial or Industrial Uses	13.4	18.6	17.1	20.3
Litter	12.3	14.6	14.4	15.3
Odors	11.6	10.2	8.8	9.5
Deteriorating Housing	8.6	10.1	9.5	10.0
Abandoned Buildings	5.8	6.8	6.8	7.1
Roads Impassable	N.A.	10.8	10.7	10.6
Want To Move Because of One or More of Above Conditions	3.4	2.8	11.1	11.4

Includes both owner and renter occupied units.

N.A. - Not Available.

The questions asked were "Here is a list of conditions which many people have on their streets. Which, if any, do you have? Street or highway noise? Heavy traffic? Streets or roads continually in need of repair, or open ditches? Roads impassable due to snow, water, etc. (asked 1974-1976 only)? Poor street lighting? Neighborhood crime? Trash, litter, or junk in the streets (roads), or on empty lots, or on properties in this neighborhood? Boarded-up or abandoned structures? Occupied housing in rundown condition? Commercial, industrial, or other nonresidential activities? Odors, smoke, or gas? Noise from airplane traffic?"
1973: "Do you consider it (condition) to be disturbing, harmful or dangerous?"
1974-1976: "Does it (condition) bother you?"
All years: "Is it so objectionable that you would like to move from the neighborhood?"

Sources: U.S. Bureau of the Census and Department of Housing and Urban Development, Annual Housing Survey: 1973, Part B, p. 8; U.S. Bureau of the Census and Department of Housing and Urban Development, Annual Housing Survey: 1974, Part B, p. 10; U.S. Bureau of the Census and Department of Housing and Urban Development, Annual Housing Survey: 1975, Part B, p. 12; U.S. Bureau of the Census and Department of Housing and Urban Development, Annual Housing Survey: 1976, Part B, p. 12.

3-17 Opinion of Neighborhood Deficiencies, by Location, 1975
(in percentages)

Deficiency	United States Total	Inside SMSA's			Outside SMSA's
		Total	In Central Cities	Not In Central Cities	
Noise (airplane and street)	50.9	55.1	56.9	53.5	41.9
Heavy Traffic	30.2	30.2	34.1	26.9	30.1
Inadequate Street Lights	25.0	22.8	15.4	29.1	29.6
Crime	18.4	22.5	27.9	17.9	9.5
Streets in Need of Repair	17.1	14.6	14.0	15.1	22.4
Commercial or Industrial Uses	17.1	18.0	21.4	15.2	14.9
Litter	14.4	14.9	18.5	11.9	13.2
Roads Impassable	10.7	9.8	9.9	9.8	12.4
Deteriorating Housing	9.5	10.0	12.8	7.6	8.3
Odors	8.8	9.3	10.0	8.8	7.8
Abandoned Buildings	6.8	7.2	10.1	4.6	6.2
Want to Move Because of One or More of Above Conditions	11.1	12.9	16.3	9.9	7.3

Source: U.S. Bureau of the Census and Department of Housing and Urban Development, Annual Housing Survey, 1975, Part B, p. 12.

3-18 Neighborhood Services Rated as Inadequate, 1973-1976
(in percentages)

Services	1973	1974	1975	1976
Public Transportation	31.9	37.8	36.0	34.5
Shopping	12.6	13.4	13.3	13.2
Hospitals or Health Clinics	N.M.	12.0	11.8	12.4
Police Protection	N.M.	9.0	8.4	9.2
Fire Protection	N.M.	4.9	4.3	4.8
Schools	5.4	4.2	3.6	3.9

N.M. - Not Measured.

The question asked was: (1973) "Do you have inadequate or unsatisfactory public transportation, schools, neighborhood shopping such as grocery stores or drug stores? (yes/no)
(1974-1976) "Do you have adequate or satisfactory public transportation, schools, neighborhood shopping such as grocery stores or drug stores, police protection, fire protection, hospitals or health clinics?" (yes/no/don't know).

Sources: U.S. Bureau of the Census and Department of Housing and Urban Development, Annual Housing Survey: 1973, Part B, pp. 8, 9; U.S. Bureau of the Census and Department of Housing and Urban Development, Annual Housing Survey: 1974, Part B, p. 11; U.S. Bureau of the Census and Department of Housing and Urban Development, Annual Housing Survey: 1975, Part B, p. 13; U.S. Bureau of the Census and Department of Housing and Urban Development, Annual Housing Survey: 1976, Part B, p. 13.

3-19 Neighborhood Services Rated as Inadequate, by Location, 1975
(in percentages)

Services	United States Total	Inside SMSA's			Outside SMSA's
		Total	In Central Cities	Not In Central Cities	
Owner and Renter Occupied Units:					
Public Transportation	36.0	28.2	13.2	41.0	53.1
Schools	3.6	3.6	4.0	3.2	3.6
Shopping	13.3	11.5	10.5	12.3	17.1
Police Protection	8.4	7.4	8.1	6.8	10.8
Fire Protection	4.3	2.1	1.3	2.8	8.9
Hospitals or Health Clinics	11.8	9.6	6.5	12.3	16.6
Owner Occupied Units:					
Public Transportation	42.0	34.8	17.1	45.3	55.1
Schools	3.8	3.8	4.4	3.4	3.9
Shopping	14.6	12.5	11.0	13.4	18.5
Police Protection	8.8	7.2	7.2	7.3	11.6
Fire Protection	5.2	2.6	1.4	3.3	9.9
Hospitals or Health Clinics	13.1	10.8	6.8	13.1	17.4
Renter Occupied Units:					
Public Transportation	25.3	17.8	9.3	30.4	47.7
Schools	3.1	3.3	3.6	2.7	2.7
Shopping	10.8	9.9	10.1	9.7	13.5
Police Protection	7.8	7.6	8.9	5.6	8.5
Fire Protection	2.7	1.5	1.3	1.7	6.2
Hospitals or Health Clinics	9.4	7.8	6.3	10.1	14.3

Source: U.S. Bureau of the Census and Department of Housing and Urban Development, Current Housing Reports, Annual Housing Survey: 1975, Part B, p. 13.

3-20 Overall Opinion of Neighborhood, U.S. Total, 1973-1976
(in percentages)

Opinion	1973	1974	1975	1976
Owner and Renter Occupied Units:				
Excellent	35.2	36.4	35.4	34.6
Good	44.6	45.3	46.7	47.0
Fair	16.7	15.0	14.9	15.3
Poor	3.0	2.8	2.4	2.5

Sources: U.S. Bureau of the Census and Department of Housing and Urban Development, Annual Housing Survey: 1973, Part B, p. 9; U.S. Bureau of the Census and Department of Housing and Urban Development, Annual Housing Survey: 1974, Part B, p. 12; U.S. Bureau of the Census and Department of Housing and Urban Development, Annual Housing Survey: 1975, Part B, p. 13; U.S. Bureau of the Census and Department of Housing and Urban Development, Annual Housing Survey: 1976, Part B, pp. 13-14.

3-21 Overall Opinion of Neighborhood, by Location, 1975
(in percentages)

Opinion	United States Total	Inside SMSA's			Outside SMSA's
		Total	In Central Cities	Not In Central Cities	
Owner and Renter Occupied Units:					
Excellent	35.4	34.1	25.8	41.1	38.4
Good	46.7	46.3	47.0	45.8	47.6
Fair	14.9	16.2	22.0	11.3	12.1
Poor	2.4	2.9	4.6	1.4	1.5
Owner Occupied Units:					
Excellent	42.1	41.7	34.1	46.2	42.6
Good	45.2	44.9	47.0	43.7	45.7
Fair	10.9	11.4	15.8	8.8	10.0
Poor	1.5	1.6	2.6	.9	1.2
Renter Occupied Units:					
Excellent	23.4	22.1	17.6	28.6	27.3
Good	49.6	48.6	47.0	50.8	52.7
Fair	22.3	23.8	28.1	17.6	17.5
Poor	4.2	4.9	6.5	2.5	2.1

Totals are less than 100% due to rounding and opinions not reported.

Source: U.S. Bureau of the Census and Department of Housing and Urban Development, Current Housing Reports, Annual Housing Survey: 1975, Part B, pp. 13-14.

3-22 Land Use in Twelve Large Cities (1), 1960

Land Use	Percent of City Land
Developed	86
Residential (2)	33
Road and Highway	21
Industrial (3)	11
Commercial (4)	4
Other Public (5)	17
Not Yet Developed (6)	14

(1) The 12 cities studied were Boston, Buffalo, Cincinnati, Cleveland, Detroit, Miami, Minneapolis, New York, Newark, Pittsburgh, Providence, and St. Louis.

(2) Residential land includes both single-family and multifamily dwellings.

(3) Industrial land includes heavy and light industry, railroads and airports.

(4) Commercial land includes wholesaling, retailing and service uses.

(5) Other Public land includes schools, public buildings, parks, playgrounds, cemeteries, and related public and semipublic uses.

(6) Land not yet developed is the sum of vacant land and underwater areas. Vacant land includes agricultural land and parking lots.

Source: Niedercorn, John H., and Hearle, Edward, F. R., Recent Land Use Trends in Forty-Eight Large American Cities, September, 1963, The Rand Corporation, Memorandum RM-3664-1-FF, Table 3, p. 6.

TRANSPORTATION

4-1 Major Transportation Networks, 1925-1975
(in thousands of miles)

Year	Roads			Pipelines			Railroads	Airways	Navigable Waterways
	Total Roadway	Rural Roads	Municipal Roads and Streets	Total Pipelines	Natural Gas Transmission	Petroleum			
1925	3,246	3,006	240			70	249		
1930	3,259	3,009	250			89	249	30	
1935	3,310	3,032	278			92	242	29	
1940	3,287	2,920	367			100	234	43	24.7
1945	3,319	2,939	380			113	227	49	24.8
1950	3,313	2,922	391	242	113	129	224	77	25.0
1955	3,418	2,954	464	286	146	140	221	79	25.1
1960	3,546	2,989	557	336	184	152	218	101	25.3
1965	3,690	3,009	681	372	211	161	212	114	25.4
1970	3,730	3,169	561	429	253	176	206	172	25.5
1975	3,838	3,178	637	437	265	173	200	169	25.5

Sources:
Roads: U.S. Bureau of the Census, Historical Statistics of the United States, Colonial Times to 1970, Series Q50, Q51, Q55; Department of Transportation, Federal Highway Administration, Highway Statistics, Summary to 1975, p. 204; Department of Transportation, Federal Highway Administration, Highway Statistics, 1970, published 1974, Table M-1.
Pipelines: U.S. Bureau of the Census, Historical Statistics of the United States, Colonial Times to 1970, Series Q251; Department of Transportation, National Transportation Trends and Choices (to the year 2000), published 1977, p. 302; and Energy Statistics, August, 1976, pp. 8, 10.
Railroads: Nelson, James C., Railroad Transportation and Public Policy Yearbook of Railroad Facts, 1976 Edition, p. 48.
Airways: U.S. Bureau of the Census, Historical Statistics of the United States, Colonial Times to 1970, Series Q579.
Waterways: Transportation Association of America, Facts and Trends, published 1974, p. 31.

4-2 Airports, 1930-1975

Year	Points Served by Scheduled Airlines	Lighted Airports	Unlighted Airports (1)	Total (2)
1930		640	1,142	1,782
1935		698	1,670	2,368
1940		776	1,555	2,331
1945		1,007	3,019	4,026
1950		1,670	4,733	6,403
1955	539	1,247	5,592	6,839
1960	567	2,133	4,748	6,881
1965	528	2,878	6,688	9,566
1970	474	3,554	7,707	11,261
1975	397	3,279	9,972	13,251

(1) Estimated by subtracting the number of lighted airports from the total.

(2) Total in operation. Includes military airports with joint civil and military uses.

Sources: U.S. Bureau of the Census, Historical Statistics of the United States, Colonial Times to 1970, Series Q604, 605, p. 772; Department of Transportation, National Transportation Trends and Choices, published 1977, p. 230; U.S. Bureau of the Census, Statistical Abstract of the United States: 1977, Table 1099, p. 656; and Federal Aviation Administration, unpublished data.

4-3 National Interstate and Defense Highway System, 1950-1976
(in miles)

Year	Rural	Urban	Total
1950	34,022	3,778	37,800
1955	34,480	5,510	39,990
1960	35,505	5,112	40,617
1965	34,673	6,258	40,931
1970	34,782	7,776	42,558
1974	34,025	8,776	42,801
1975	33,893	8,965	42,858
1976	32,944	9,663	42,607

Sources:
1950-1975: Department of Transportation, Federal Highway Administration, Highway Statistics, Summary to 1975, p. 279.
1976: Department of Transportation, Federal Highway Administration, Highway Statistics, 1976, p. 138.

4-4 Road and Street Mileage in the United States by Surface Type, 1904-1975
(in thousands of miles)

Year	Total Mileage	Surfaced			Non-Surfaced Total
		Total	Bituminous	Gravel or Stone	
1904	2,351	204	N.A.	N.A.	2,147
1909	2,410	245	N.A.	N.A.	2,165
1921	3,160	447	N.A.	N.A.	2,713
1925	3,246	626	N.A.	N.A.	2,620
1930	3,259	854	N.A.	N.A.	2,405
1941	3,310	1,608	599	1,009	1,702
1950	3,313	1,939	780	1,159	1,374
1960	3,546	2,557	1,327	1,230	989
1970	3,730	2,946	1,658	1,288	784
1975	3,838	3,101	1,856	1,245	737

N.A. - Not Available.

Source: Department of Transportation, Federal Highway Administration, Highway Statistics, Summary to 1975, published 1977, pp. 204, 206, 208, 210 and 211.

4-5 Land Required for Each Mile of Roadway, 1975
(in acres required per roadway mile)

Roadway Type	Number of Acres
Major Highway	
Interstate-Urban Segment (1)	35
Interstate-Rural Segment (2)	38
4-Lane Highway (3)	33.5
2-Lane Highway (4)	18.2
Urban Street (5)	14.6
	7.3

Data based on assumed right-of-way widths:

(1) 250 feet (30.34 acres + 25% for interchange).

(2) 250 feet (30.34 acres + 10% for interchange).

(3) 150 feet.

(4) 120 feet.

(5) 60 feet.

Source: Estimated data from Department of Interior, National Park Service, Office of Park Planning and Environmental Quality, October 24, 1978 memo.

4-6 Energy Pipelines, 1975 and Proposed
(in thousands of miles)

Pipelines	1975 (1)	1990 (2)
Crude Oil	56.9	48.9
Products (Liquid natural gas and liquid petroleum gas)	64.9	66.1
Natural Gas	265.2	267.0
Coal Slurry	0.273	3.789
Chemical	4.6	7.6

(1) In place or under construction.

(2) Proposed.

Source: Department of Transportation, National Transportation, Trends and Choices, published 1977, p. 302.

4-7 Heavy Rail Transit, Subway and Elevated Lines, 1945-1985
(in miles (1))

City/Area	1945	1955	1965	1975	1985 (2)
Atlanta	0.0	0.0	0.0	0.0	15.0
Baltimore	0.0	0.0	0.0	0.0	8.0
Boston	18.5	22.9	22.9	33.2	39.2
Chicago	87.0	73.0	73.0	89.0	103.8
Cleveland	0.0	13.0	15.0	19.0	19.0
District of Columbia (Metro)	0.0	0.0	0.0	0.0	90.0
New York City	N.A.	N.A.	236.7	N.A.	N.A.
Port Authority/Trans Hudson	13.8	13.8	13.8	13.8	13.8
Port Authority/NJ/Penn	0.0	0.0	0.0	14.5	14.5
Philadelphia (3)	22.5	24.0	24.5	24.5	24.5
San Francisco (Bart)	0.0	0.0	0.0	71.5	71.5
Total	378.5(a)	383.4(a)	385.9	502.2(a)	636.0(a)

N.A. - Not Available.

(1) Miles of track, which is not the equivalent of route miles.

(2) Expected to be in operation by 1985.

(3) Little net change is due to the demolition of old lines and simultaneous addition of new lines.

(a) Includes an estimated 236.7 miles of track for New York City.

Sources: National Capital Transportation Agency, Bob Abrams, "United States Rapid Transit Systems", September, 1965; and Department of Transportation, Urban Mass Transit Transportation Administration, Office of Transit Assistance, unpublished data.

4-8 Transportation Vehicles, 1920-1975

Year	Resident Population (thousands)	Automobiles		Motorcycles		Trucks		Bicycles	
		A	B	A	B	A	B	A	B
1920	106,466	8,132	76.4			1,108	10.4		
1925	115,832	17,481	150.9			2,570	22.2		
1929	121,770								
1930	123,077	23,035	187.2			3,675	29.9		
1935	127,250	22,568	177.4			3,919	30.8		
1939	130,880								
1940	132,457	27,466	207.4	136	1.03	4,886	36.9		
1944	133,915								
1945	133,434	25,797	193.3			5,076	38.0		
1950	151,868	40,339	265.6	454	2.99	8,599	56.6		
1951	153,982								
1955	165,069	52,145	315.9	412	2.50	10,289	62.3		
1960	179,979	61,671	342.7	574	3.19	11,914	66.2	23,397	130
1961	182,992								
1965	193,526	75,258	388.9	1,382	7.14	14,786	76.4		
1970	203,810	89,244	437.9	2,824	13.90	18,797	92.2	50,953	250
1974	211,389	104,856	496.0	4,966	23.49	24,630	116.5		
1975	213,032	106,717	500.9	5,494	25.79	25,781	121.0		

A - Thousands of registrations.

B - Vehicles per thousand population (calculated using resident population data).

Sources:
Population Data: U.S. Bureau of the Census, Statistical Abstract, 1976, Table 2, p. 5. Resident population excludes Armed Forces abroad.
Automobiles and Trucks: Department of Transportation, Federal Highway Administration, Highway Statistics, Summary to 1975, Table MV-200, p. 45.
Motorcycles: 1940-1975: U.S. Bureau of the Census, Statistical Abstract, 1976, p. 593.
Bicycles: Environmental Protection Agency, Bicycle Transportation, December, 1974, p. 49.

4-8 Transportation Vehicles, 1920-1975 (cont.)

Year	Resident Population (thousands)	Buses		Aircraft (1)		Railroad Cars			
						A			
		A	B	A	B	Total	Freight(2)	Passenger(3)	B
1920	106,466								
1925	115,832	18	.16						
1929	121,770					2,673	2,611	62	22.0
1930	123,077	41	.33	9.818	.08				
1935	127,250	59	.46	9.072	.07				
1939	130,880					2,007	1,962	45	15.3
1940	132,457	101	.76	17.928	.14				
1944	133,915					2,115	2,068	47	15.8
1945	133,434	162	1.21	37.789	.28				
1950	151,868	224	1.47	92.809	.61				
1951	153,982					2,089	2,047	42	13.6
1955	165,069	255	1.54	85.320	.52	2,033	1,996	37	12.3
1960	179,979	272	1.51	111.580	.62				
1961	182,992					1,932	1,905	27	10.6
1965	193,526	314	1.62	142.078	.73	1,822	1,801	21	9.4
1970	203,810	378	1.85	154.450	.76	1,795	1,784	11	8.8
1974	211,389	447	2.11	188.000	.89	1,728	1,721	7	8.2
1975	213,032	462	2.17	197.200	.92	1,731	1,724	7	8.13

A - Thousands of registrations.

B - Vehicles per thousand population (calculated using resident population data).

(1) Beginning 1950, includes active and inactive aircraft. 1950 to 1960 includes gliders. All years include civil aircraft only.

(2) All years include Class 1 Railroad, other Railroad, and car companies.

(3) Includes Pullman Company cars from 1929 to 1968. Amtrack included beginning in 1971.

Sources:
Population Data: U.S. Bureau of the Census, Statistical Abstract, 1976, p. 5, Table 2. Resident population excludes Armed Forces abroad.
Buses: Department of Transportation, Federal Highway Administration, Highway Statistics, Summary to 1975, Table MV-200, p. 45.
Aircraft: 1930-1970: U.S. Bureau of the Census, Historical Abstracts of the United States, Colonial Times to 1970, Q606, p. 772.
1974: U.S. Bureau of the Census, Statistical Abstract, 1976, Table 1028, p. 613.
1975: U.S. Bureau of the Census, Statistical Abstract, 1977, Table 1099, p. 656.

4-9 Sales of Specialized Transportation Vehicles, 1961-1978
(in thousands)

Year	Motorcycles (1)	Snowmobiles (2)	Recreation Vehicles (3)	Mini-bikes (4)	Mopeds
1961			63 (a)		
1962			80 (a)		
1963			119 (a)		
1964			151 (a)		
1965			193		
1966			220		
1967			244	260	
1968		85	331	350	
1969		255	401	425 (b)	
1970		425	380	550 (b)	
1971		495	451	620 (b)	
1972	1,233	460	583		
1973	1,429	450	529		
1974	1,109	435	296		
1975	831	316	340		25
1976	986	243	541		75
1977	1,035	195	534		150
1978		226			

(1) Includes wholesale shipments to dealers by Harley Davidson, Honda, Kawasaki, Suzuki, and Yamaha for on-highway, off-highway, and dual purpose bikes.

(2) Combined North American retail sales. Year refers to model year. For example, 1978 data includes sales from April 1977 through March 1978.

(3) Total shipments of travel trailers, truck campers, camping trailers, and motor homes.

(4) Produced and distributed in the United States.

(a) Excludes motor homes.

(b) Excludes certain 2-wheel vehicles.

Sources:
Motorcycles: Motorcycle Industry Council, 1978 Motorcycle Statistical Annual, p. 12; and previous annual issues.
Snowmobiles: International Snowmobile Industry Association, An Assessment of the Snowmobile Manufacturing Industry and Sport, 1978, Appendix A, p. 47.
Recreation Vehicles: (1961-1966): Recreational Vehicle Industry Association, Motor Vehicle Facts and Figures 1976, p. 27; and (1967-1977): Recreational Vehicle Industry Association, Facts and Trends 1977, p. 4.
Minibikes: U.S. Department of Interior, Off Road Recreation Vehicles, published November 1971, p. 100.
Mopeds: Motorized Bike Association, unpublished data.

4-10 Intercity Domestic Freight Traffic, 1929-1975

Year	Resident Population (1) (thousands)	Total Ton-Miles (billions)	Total Ton-Miles Per Capita	Railroad (2)		Oil Pipeline		Truck		Water (3)		Air	
				A	B	A	B	A	B	A	B	A	B
1929	121,770	608.0	4,993.0	455	3,737	27	222	20	164	106(a)	870	.003	.025
1939	130,880	786.0	6,006.1	339	2,590	56	428	53	405	338	2,583	.01	.08
1944	138,916	1,158.1	8,336.5	747	5,377	133	957	58	418	220	1,584	.07	.5
1949	149,767	1,138.2	7,599.3	535	3,572	115	768	127	848	361	410	.20	1.3
1959	177,830	1,549.8	8,715.5	582	3,273	227	1,277	279	1,569	461	2,592	.80	4.5
1969	202,677	2,120.2	10,460.8	774(b)	3,819	411	2,028	404	1,993	528	2,605	3.2	15.8
1974	211,901	2,445.9	11,543.4	856(b)	4,040	506	2,388	495	2,336	585	2,761	3.9	18.4
1975	213,540	2,273.0	10,643.7	761(b, c)	3,564	510	2,388	441	2,065	557	2,608	4.0	18.7

A - Billions of Ton-Miles.

B - Ton-Miles Per Capita.

(1) Excludes Armed Forces abroad.

(2) Railroads of all classes, including electric.

(3) Includes Great Lakes, inland waterways, and domestic ocean trade.

(a) Excludes ton-miles of domestic ocean trade.

(b) Excludes ton-miles of mail and express.

(c) Preliminary estimate.

Sources:
Population: U.S. Bureau of the Census, Statistical Abstract, 1976, Table 2, p. 5.
Transportation Modes: U.S. Department of Transportation, National Transportation Trends and Choices (to the year 2000), published 1977, p. 114.

4-11 Intercity Passenger Transportation, 1940-1976

Year	Resident(1) Population (thousands)	Passenger Miles (bils.)	Miles per Capita	Automobiles		General Aviation		Commercial Air		Bus		Rail		Water	
				A	B	A	B	A	B	A	B	A	B	A	B
1940	132,457	305.5	2,306.5	292.7	2,209.8	.1	.75	1.2	9.1	10.2	77.0			1.3	9.8
1945	133,434	254.1	1,904.2	220.3	1,651.0			4.3	32.2	27.4	205.3			2.1	15.7
1950	151,868	499.7	3,290.0	438.3	2,886.1	.8	5.3	9.3	61.2	22.7	149.5	27.4	180	1.2	7.9
1955	165,069	683.8	4,142.5	637.4	3,861.4	1.5	9.1	21.3	129.0	21.9	132.7			1.7	10.3
1960	179,979	779.5	4,331.1	706.1	3,923.0	2.3	12.8	31.7	176.1	19.3	107.2	17.4	97	2.7	15.0
1965	193,526	902.7	4,664.4	817.7	4,225.3	4.4	22.7	53.7	277.4	23.8	123.0			3.1	16.0
1970	203,810	1,180.2	5,791.0	1,026.0	5,034.0	9.1	45.0	109.5	537.3	25.3	124.1	6.3	31	4.0	19.6
1975	213,032	1,305.6	6,128.1	1,123.0	5,271.5	11.1	52.0	136.9	642.6	25.4	119.2	5.2	24	4.0	18.8
1976	214,669	1,380.0	6,428.4	1,187.0	5,529.4	11.6	54.0	152.3	709.5	25.1	116.9			4.0	18.6

A - Billions of passenger miles.

B - Passenger miles per capita.

(1) Excludes Armed Forces abroad.

Sources:
Population: U.S. Bureau of the Census, Statistical Abstract, 1976, p. 5; and U.S. Bureau of the Census, Current Population Reports, Series P-25, No. 711.
Transportation Modes: Transportation Association of America, Transportation Facts and Trends, July, 1977, p. 18; and Department of Transportation, Office of the Secretary, Transportation Planning, unpublished data.

4-12 Local Passenger Transportation, 1950-1975

Year	Resident(1) Population (thousands)	Passenger Miles (bils.)	Miles per Capita	Automobiles (2)		School Bus		Bus		Rail & Other Pub. Transit		Commuter Rail	
				A	B	A	B	A	B	A	B	A	B
1950	151,868	604.9	3,983	516.0	3,398	15.4	101	27.7	182	40.7	268	5.1	34
1960	179,979	791.5	4,397	723.4	4,019	28.2	157	19.3	107	16.4	91	4.2	23
1970	203,810	1,166.7	5,725	1,094.3	5,369	40.0	196	15.2	75	12.6	62	4.6	23
1975	213,032	1,302.2	6,113	1,223.5	5,743	48.5	228	15.4	72	10.4	49	4.4	21

A - Billion miles.

B - Passenger miles per capita.

(1) Excludes Armed Forces abroad.

(2) Automobiles include taxis and personal trucks.

Sources:
Population: U.S. Bureau of the Census, Statistical Abstract, 1976, p. 5.
Transportation Modes: Department of Transportation, Office of the Secretary, Transportation Planning, unpublished data.

4-13 Mode of Transportation for Commuters, 1963 and 1970

Mode of Transportation	1963		1970	
	Number (millions)	Percent of Commuters	Number (millions)	Percent of Commuters
All commuters	50	100	69	100
Automobile	41	82	60	87
Driver, alone	28	56	N.A.	N.A.
With others	13	26	N.A.	N.A.
Driver	N.A.	N.A.	51	74
Passenger	N.A.	N.A.	9	13
Public transportation	7	14	7	10
Other	2	4	2	3

N.A. - Not Available.

Data not strictly comparable for years shown. Data on mode of transportation to work was taken from the Home-to-Work Travel Survey of the 1963 Census of Transportation and the 1970 Census of Population. Major differences between the 1963 and 1970 data are:

1. 1963 data include persons working at a fixed place at least 1/4 mile away from home; 1970 data include all commuters.
2. Data from the 1963 and 1970 studies on the use of automobiles as a means of commuting to work are comparable; 1963 data, however, can be broken down to show automobile driver alone, whereas the 1970 data can show driver and/or passenger but not driver alone.
3. Because of the limitations of the 1963 survey, no comparisons can be made of people walking to work. In 1970, 7 percent of the work force walked to work and 2 percent worked at home. Both groups have been omitted from the data shown in the "other" category.

Source: Office of Management and Budget, Social Indicators 1973, p. 149.

4-14 Energy Use by Transportation Mode, 1965-1975
(in trillion Btu)

Vehicle Type	1965	1970	1974	1975
Total	11,863.88	15,632.91	17,354.86	N.A.
Highway (1)	8,941.95	11,629.38	13,417.01	13,750.01
Passenger car and taxi	6,273.36	8,203.00	9,217.74	9,497.63
Motorcycles	8.62	16.87	55.85	55.85
Buses	119.95	126.59	114.18	119.24
Intercity	37.78	42.33	27.46	25.01
School	31.11	37.49	41.61	42.73
Local	51.07	46.77	45.11	51.50 (a)
Trucks	2,540.01	3,282.92	4,029.24	4,077.29
Single unit	1,687.36	2,153.80	2,639.62	2,732.46
Combinations	852.36	1,129.12	1,389.62	1,344.83
Rail	575.30	570.98	630.52	562.99
Local rail (heavy and light)	27.39	27.57	29.98	30.16 (a)
Operating railroads (2)	547.91	543.41	600.54	532.83 (a)
Passenger	87.23	44.77	34.39	N.A.
Freight	460.68	493.64	566.15	N.A.
Air (1)	740.02	1,460.33	1,393.26	N.A.
General Aviation	47.42	96.87	103.55	N.A.
Air carrier (3)	692.60	1,363.46	1,289.71	1,284.37
Water (4)	565.45	753.26	801.27	N.A.
Pipeline	517.00	744.60	684.80	N.A.
Gasoline other than highway, water, air reported to FHWA	524.16	474.36	428.00	N.A.

N.A. - Not Available.

(1) Civilian only.

(2) Class I only.

(3) Certificated carriers only.

(4) Numbers are for fuel purchased domestically.

(a) Preliminary.

Source: Oak Ridge National Laboratory, Transportation Energy Conservation Data Book: Edition 2, ORNL-5320, published 1977, p. 171.

4-15 Energy Requirements for Passenger Transportation by Mode, 1973

Vehicle Type and Load	Assumed Passenger Loading	Vehicle Miles per Gallon of Fuel or Equivalent	Passenger Miles Per Gallon of Fuel or Equivalent
Heavy Rail Transit (Subway) Car, Peak Load	135	4.00	540
Intercity Passenger Train	540-720	0.50	270-360
Transit Bus, Peak Load	75	4.10	307
Intercity Bus	47	6.00	282
Heavy Rail Transit (Subway) Car, Off-Peak Load	35	4.00	140
Transit Bus, Off-Peak Load	30	4.10	123
Rail Turbine Train	320	0.33	110
Standard Size Automobile Intercity, Maximum Load	6	18.00	108
Standard Size Automobile Urban, Maximum Load	6	14.40	86
Wide-Body Commercial Jet Aircraft, 1,000 Mile Flight	256-385	0.14-0.22	54-60
Twin Jet Commercial Aircraft, 500 Mile Flight	68-106	0.44-0.54	37-47
Average Commuter Automobile	1.4	13.5	19

Source: American Public Transit Association, Transit Fact Book, published 1976, p. 46.

4-16 Energy Requirements for Freight Transportation by Mode, 1974

Vehicle Type and Load	Vehicle Miles per gallon	Ton-Miles per gallon
Train, Intercity Trip		
Full Load	.17	420
Partial Load	.14	273
Diesel Truck, Intercity Trip		
Full Load	5	125
Partial Load	4.8	69
Diesel Truck, Urban Trip	12	96
Gas Truck, Urban Trip	8	64
Wide-Body Cargo Jet	.24	16

Sources: Department of Transportation, National Air and Space Administration, "Transportation Vehicle Energy Intensities," reference paper published June, 1974; and Department of Transportation, Energy Statistics, 1975, Appendix A.

4-17 Automobile Fuel Efficiency, 1940-1985
(in miles per gallon)

Year	All Autos (1)	New Autos (2)
1940	15.29	
1945	15.03	
1950	14.95	
1951	14.99	
1952	14.67	
1953	14.70	
1954	14.58	
1955	14.53	
1956	14.36	
1957	14.40	
1958	14.30	
1959	14.30	
1960	14.28	
1961	14.38	
1962	14.37	
1963	14.26	
1964	14.25	
1965	14.07	
1966	14.00	
1967	13.93	
1968	13.79	15.0
1969	13.63	
1970	13.57	15.1
1971	13.57	
1972	13.49	14.5
1973	13.10	
1974	13.43	13.9
1975	13.53	15.6
1976	13.72	17.8
1977		18.6
1978		18.0
1979		19.0
1980		20.0
1981		22.0
1982		22.5
1983		23.1
1984		23.4
1985		23.6

(1) Average miles traveled per gallon of fuel consumed.

(2) 1968-1977: Sales-weighted city/highway combined fuel economy by model year based on post-1974 test procedures.
1978-1985: Fuel economy standards, sales weighted by manufacturer.

4-17 Automobile Fuel Efficiency, 1940-1985 (cont.)

Sources:

All Autos: Department of Transportation, Federal Highway Administration, Highway Statistics, 1976, Table VM-1 and previous annual issues; and Federal Highway Administration, Highway Statistics Summary to 1965, Table VM-201A.

New Autos: (1968-1977): Oak Ridge National Laboratory, Transportation Energy Conservation Data Book: Edition 2, ORNL-5320, published 1977, p. 185.
(1978-1985): U.S. Department of Energy, Energy Information Administration, Annual Report to Congress, Volume II - 1977, Projections of Supply and Demand, published 1978, p. 117.

4-18 Automobile Emissions, 1957-1985
(in grams per mile)

Year	All Autos (1)			New Autos (2)		
	Hydrocarbons	Carbon Monoxide	Nitrogen Oxides	Hydrocarbons	Carbon Monoxide	Nitrogen Oxides
1957-1967	8.7	87	N.A.	8.7	87	4.0
1968	N.A.	N.A.	N.A.	6.0	49	N.A.
1969	N.A.	N.A.	N.A.	6.0	49	N.A.
1970	10.6	74.4	3.9	4.1	34	N.A.
1971	9.9	71.7	4.0	4.1	34	N.A.
1972	9.4	69.7	4.1	3.0	28	N.A.
1973	8.9	68.3	4.0	3.0	28	3.1
1974	8.5	67.5	3.9	3.0	28	3.1
1975	8.0	65.4	3.7	1.5	15	3.1
1976	7.5	62.5	3.5	1.5	15	3.1
1977	7.0	59.2	3.2	1.5	15	2.0
1978	6.4	55.6	3.0	1.5	15	2.0
1979				1.5	15	2.0
1980				0.41	7.0	1.0
1981-1985				0.41	3.4	1.0

N.A.- Not Available

(1) Emission estimates for average of all autos, 1970-1978, assume an average speed of 19.6 mph at 75 degrees Fahrenheit.

(2) Emission estimates for new autos are measured by the 1975 Federal Test Procedure. Data include light duty trucks in 1974 and previous years.

Sources:
All Autos:
(1957-1967): U.S. Bureau of the Census, Statistical Abstract, 1977, Table 346, p. 206.
(1970-1978): Environmental Protection Agency, Office of Air, Noise and Radiation, Mobile Source Emission Factors, EPA 400/9-78-006, published 1978; and Environmental Protection Agency, Office of Transportation and Land Use Policy, unpublished data.
New Autos:
(All Years): Environmental Protection Agency, Costs of Clean Air, 1974, Table 3-1, p. III-4; Environmental Protection Agency, Office of Air and Waste Management, Automobile Exhaust Emission Surveillance Analysis, FY 74 program, Ann Arbor, Michigan, p. 12; Council on Environmental Quality, Environmental Quality - 1977, p. 22; and Department of Commerce, Bureau of Economic Analysis, unpublished data.

4-19 Noise Levels of Surface Transportation Vehicles, 1972

Transportation Mode	Noise Levels at 50 feet (decibels)
Highway	
Heavy Trucks	84
Motorcycles	82
Garbage Trucks	82
Highway Buses	82
Automobiles (sport)	75
City Buses	73
Light Trucks	72
Automobiles (standard)	69
Rail	
Trains	94
Rapid Transit	86
Recreational Vehicles	
Off-road Motorcycles	85
Snowmobiles	85
Motorboats	80

Source: Environmental Protection Agency, Report to the President and Congress on Noise, published 1971, p. 170.

4-20 Speech Interference and Annoyance Levels, 1972

	60 db	70 db	80 db	90 db
Speech Interference: Percent of key words misunderstood	3	53	100	100
Annoyance Level: Percent of exposed people highly annoyed	25	44	62	unknown

db - decibels.

Source: Environmental Protection Agency, Report on Airport and Aircraft Noise, published 1973, Serial No. 93-8, p. 52.

4-21 Extent of Noise Problem at Major Airports, 1972

Airport	Number of People Exposed: (thousands) (1)	
	to NEF 30 (2)	to NEF 40 (2)
Atlanta	99.8	27.0
Boston	431.3	32
Buffalo	113.8	9.7
Chicago-Midway	38.5	1.8
Chicago-O'Hare	771.7	66.6
Cleveland	128.7	11.2
Denver	180.3	28.3
Dulles	3.5	0
J.F. Kennedy	507.3	111.5
LaGuardia	1057.0	17.1
Los Angeles	292.4	51.1
Miami	260.0	29.7
Minneapolis-St. Paul	96.7	8.8
Newark	431.9	27.5
New Orleans	32.5	8.9
Philadelphia	76.9	0.3
Phoenix	20.5	6.2
Portland	1.2	0.3
San Diego	77.3	24.0
San Francisco	124.1	11.4
Seattle	123.2	17.3
St. Louis	100.0	8.5
Washington National	24.4	2.0
Total		
23 Major Airports	5,000	500
All Other Airports	1,100	100
Grand Total	6,100	600

(1) Estimated from 1970 Census data.

(2) NEF = Noise Exposure Forecast, a measure of the total aircraft-generated noise energy received at locations near an airport during a typical 24-hour period.

Source: Department of Transportation, Federal Aviation Administration, Aviation Noise Abatement Policy, published 1976, p. 20.

10

INDUSTRIAL PRODUCTION AND SOLID WASTE

5-1 Gross National Product (GNP) by Industry, 1950-1976
(in billions of 1972 dollars)

Year	Gross National Product	Manufacturing			Wholesale and Retail Trade	Finance, Insurance and Real Estate	Government and Government Enterprises	Services	Transportation Communication, & Utilities	Construction	Agriculture, Forestry, and Fisheries	All Other (1)
		Total	Durable Goods Industries	Non-Durable Goods Industries								
1950	533.5	131.3	78.1	53.2	87.6	64.4	75.4	59.4	39.6	29.3	29.1	17.5
1955	654.8	165.8	103.4	62.4	103.2	82.0	95.4	67.5	49.4	38.2	31.9	21.4
1960	736.8	172.0	101.5	70.5	117.9	101.9	107.2	82.2	58.0	46.1	32.2	19.4
1965	925.9	235.1	144.1	91.0	148.6	127.2	127.4	101.2	74.3	57.0	33.0	22.1
1970	1,075.3	260.6	154.4	106.2	178.4	152.9	152.0	124.7	95.1	57.1	34.3	20.4
1971	1,107.5	264.1	155.3	108.7	186.8	160.6	153.1	126.6	97.3	57.1	36.1	25.7
1972	1,171.1	288.8	171.9	116.8	201.2	167.3	154.9	134.5	103.6	58.0	35.4	27.7
1973	1,235.0	313.0	189.0	124.1	212.0	171.1	157.3	143.1	112.6	58.3	35.9	31.6
1974	1,217.8	291.9	176.0	115.9	205.7	180.3	160.0	144.7	112.4	56.0	35.7	31.1
1975	1,202.1	273.3	161.1	112.1	208.7	182.6	162.7	145.0	112.8	50.5	37.1	29.5
1976	1,274.7	304.9	180.6	124.3	219.5	193.9	164.0	152.3	116.9	55.3	36.8	31.1

(1) Mining, rest of world, and residual.

Source: Council of Economic Advisors, Economic Report of the President, transmitted to the Congress January, 1978, p. 263.

5-2 U.S. Employment (1) by Industry, 1950-1976
(in thousands)

Year	Total (2)	Manufacturing			Wholesale and Retail Trade			Government			Services	Transportation and Public Utilities	Finance, Insurance, and Real Estate	Contract Construction	Agriculture (2)	Mining
		Total	Durable	Nondurable	Total	Wholesale	Retail	Total	Federal	State and Local						
1950	58,918	15,241	8,094	7,147	9,386	2,518	6,868	6,026	1,928	4,098	5,382	4,034	1,919	2,333	7,160	901
1955	62,170	16,882	9,541	7,340	10,535	2,796	7,740	6,914	2,187	4,723	6,274	4,141	2,335	2,802	6,450	792
1960	65,778	16,696	9,459	7,336	11,391	3,004	8,388	8,353	2,270	6,083	7,423	4,004	2,669	2,885	5,458	712
1965	71,088	18,062	10,406	7,656	12,716	3,312	9,404	10,074	2,378	7,696	9,087	4,036	3,023	3,186	4,361	632
1970	78,627	19,349	11,195	8,154	15,040	3,816	11,225	12,561	2,731	9,830	11,621	4,504	3,687	3,536	3,462	623
1971	79,120	18,572	10,597	7,975	15,352	3,823	11,529	12,887	2,696	10,192	11,903	4,457	3,802	3,639	3,387	609
1972	81,702	19,090	11,006	8,084	15,975	3,943	12,032	13,340	2,684	10,656	12,392	4,517	3,943	3,831	3,472	625
1973	84,409	20,068	11,839	8,229	16,674	4,107	12,568	13,739	2,663	11,075	13,021	4,644	4,091	4,015	3,452	644
1974	85,936	20,046	11,895	8,151	17,017	4,223	12,794	14,177	2,724	11,453	13,617	4,696	4,208	3,957	3,492	694
1975	84,783	18,347	10,679	7,668	17,000	4,177	12,824	14,720	2,748	11,973	14,006	4,498	4,223	3,512	3,380	745
1976	87,485	18,956	11,026	7,930	17,694	4,263	13,431	14,948	2,733	12,215	14,644	4,509	4,316	3,594	3,297	783

Data for non-agricultural sectors include Alaska and Hawaii beginning 1960. Data for total labor force and agricultural workers for 1960, 1972, and 1973 are not strictly comparable with prior years due to population adjustments.

(1) Persons 16 years of age and over.

(2) Data for total employment and agricultural workers are collected from household surveys and include the employed civilian (non-institutional) labor force. These data are not strictly comparable to the other sectors in which data are collected from payroll surveys.

Sources:
1950-1965: Department of Labor, Bureau of Labor Statistics, Handbook of Labor Statistics 1975 - Reference Edition, Bulletin 1865, Tables 1 and 39.
1970-1976: Department of Labor, Bureau of Labor Statistics, Handbook of Labor Statistics, 1977, Bulletin 1966, Tables 1 and 38.

5-3 Manufacturing Production by Sector, 1950-1977
(in millions of 1972 dollars)

Year	Manufacturing Industry and SIC Code (1)					
	Manufacturing, Total, All Sectors	Machinery Except Electrical (35)	Food Processing (Food & Kindred Products) (20)	Electrical & Electronic Equipment (36)	Motor Vehicles & Equipment	Fabricated Metal Products (34)
1950	131,252	13,418	14,973	5,573	10,775	9,835
1955	165,792	17,115	17,155	8,130	14,187	12,373
1960	171,945	17,583	19,160	10,906	11,130	13,098
1965	235,123	24,941	22,569	17,666	18,475	17,441
1970	260,579	28,841	26,225	22,820	15,835	19,441
1971	264,167	27,198	26,232	22,979	20,995	18,778
1972	288,830	30,414	27,620	25,902	22,654	20,943
1973	313,034	34,383	27,449	29,038	25,540	22,991
1974	291,909	33,189	25,422	27,964	20,603	20,681
1975	277,087	32,171	28,015	25,204	20,077	18,790
1976	303,178	33,310	30,232	27,193	27,157	20,939
1977	322,330	34,863	31,207	29,405	31,967	22,289

Year	Manufacturing Industry and SIC Code (1)				
	Chemical & Allied Products (28)	Primary Metal Industry (33)	Printing & Publishing (27)	Transportation Equipment Excl. Motor Vehicles	Apparel & Related Products
1950	5,582	17,245	7,200	4,166	5,406
1955	7,835	20,345	8,746	10,555	5,959
1960	9,719	16,794	9,851	10,266	6,475
1965	14,323	22,304	12,712	13,934	7,906
1970	18,735	20,347	13,700	14,635	8,621
1971	19,404	19,251	13,831	13,217	8,859
1972	21,112	20,966	14,549	14,196	9,942
1973	22,758	24,109	15,496	13,977	11,261
1974	21,189	24,016	14,583	13,019	10,344
1975	20,815	19,260	14,023	12,133	10,409
1976	23,011	19,471	14,989	12,019	11,295
1977	25,034	19,550	15,741	12,562	11,440

5-3 Manufacturing Production by Sector, 1950-1977 (cont.)

Year	Manufacturing Industry and SIC Code (1)					
	Paper & Allied Products (26)	Lumber & Wood Products (24)	Stone, Clay, & Glass Products (32)	Rubber & Misc. Plastic Products (30)	Textile Mill Products (22)	Instruments & Related Products (38)
1950	5,090	4,593	5,420	2,733	4,074	2,185
1955	6,001	4,906	6,640	3,418	4,340	3,498
1960	6,356	4,820	6,887	4,047	4,495	4,125
1965	8,028	7,771	8,692	6,262	7,152	5,565
1970	9,175	8,867	8,758	7,787	8,461	6,982
1971	9,808	9,007	8,921	8,352	8,619	6,841
1972	11,022	9,854	9,872	9,332	9,347	7,610
1973	12,503	10,053	10,601	10,556	9,360	8,373
1974	11,654	9,845	9,519	9,487	8,859	7,887
1975	9,987	8,950	8,705	8,942	8,225	8,141
1976	11,278	9,975	9,699	9,886	9,001	8,772
1977	11,880	10,195	10,391	10,860	9,563	9,688

Year	Manufacturing Industry and SIC Code (1)				
	Petroleum & Related Products (29)	Miscellaneous Manufacturing (39)	Tobacco Manufactures (21)	Furniture & Fixtures (25)	Leather & Leather Products (31)
1950	3,567	2,403	2,452	2,483	2,079
1955	4,261	2,847	2,636	2,839	2,006
1960	4,877	3,056	3,401	2,812	2,087
1965	6,042	3,631	3,520	3,713	2,476
1970	7,180	4,214	4,026	3,684	2,245
1971	7,385	4,412	4,093	3,835	2,150
1972	7,604	4,926	4,228	4,589	2,148
1973	7,982	5,065	4,370	4,833	2,336
1974	7,747	4,817	4,425	4,496	2,163
1975	7,809	4,722	4,629	3,966	2,064
1976	8,250	5,108	4,859	4,497	2,237
1977	8,722	5,277	4,752	4,686	2,258

(1) Standard Industrial Classification code. Numbers in parentheses below sectors are SIC codes.

Source: Department of Commerce, Bureau of Economic Analysis, Survey of Current Business, annual July issues, Table 6.1; and Department of Commerce, Bureau of Economic Analysis, unpublished data.

5-4 Manufacturing Employment (1) by Sector, 1950-1976
(in thousands)

Year	Manufacturing Industry and SIC Code (2)							
	Machinery, Except Electrical (35)	Electrical Equipment and Supplies (36)	Transportation Equipment (37)	Food Processing (Food and Kindred Products) (20)	Fabricated Metal Products (34)	Apparel and Other Textile Products (23)	Primary Metal Industries (33)	Printing and Publishing (27)
1950	1,210.0	991.0	1,265.0	1,790.0	982.0	1,202.0	1,247.0	748.0
1955	1,448.5	1,240.8	1,854.6	1,824.7	1,122.4	1,219.2	1,322.5	834.7
1960	1,479.0	1,467.1	1,568.9	1,790.0	1,135.3	1.233.2	1,231.2	911.3
1965	1,735.3	1,659.2	1,740.6	1,756.7	1,269.0	1,354.2	1,301.0	979.4
1970	1,982.1	1,917.0	1,799.1	1,782.7	1,380.4	1,364.6	1,315.6	1,101.6
1971	1,811.0	1,772.4	1,729.8	1,755.0	1,334.1	1,345.4	1,229.1	1,072.2
1972	1,889.8	1,847.3	1,771.7	1,739.0	1,395.9	1,374.4	1,240.4	1,084.2
1973	2,092.1	2,020.3	1,903.7	1,718.5	1,499.9	1,405.5	1,323.7	1,104.4
1974	2,217.8	2,030.2	1,821.1	1,712.5	1,505.3	1,347.7	1,343.5	1,112.3
1975	2,068.8	1,760.6	1,649.1	1,676.4	1,335.8	1,235.1	1,179.7	1,079.3
1976	2,074.3	1,831.6	1,733.0	1,709.5	1,387.1	1,299.2	1,190.0	1,080.0

Year	Manufacturing Industry and SIC Code (2)							
	Chemicals and Allied Products (28)	Textile Mill Products (22)	Paper & Allied Products (26)	Stone, Clay, and Glass Products (32)	Rubber and Misc. Plastics Products (30)	Lumber and Wood Products (24)	Instruments and Related Products (38)	Furniture and Fixtures (25)
1950	640.0	1,256.0	485.0	547.0	311.0	808.0	250.0	364.0
1955	773.1	1,050.2	550.0	588.4	363.3	739.6	323.2	363.8
1960	828.2	924.4	601.1	604.0	379.0	626.8	354.3	383.0
1965	907.8	925.6	639.1	628.3	470.8	606.9	389.0	430.7
1970	1,049.0	975.9	705.5	640.2	580.1	572.7	460.4	459.8
1971	1,009.8	958.3	681.9	633.6	580.5	585.9	437.8	461.0
1972	1,007.5	994.1	688.9	658.9	624.8	622.6	459.0	503.4
1973	1,032.5	1,026.2	701.3	691.4	677.1	642.8	496.6	535.5
1974	1,056.6	988.1	701.8	690.2	675.9	626.2	519.5	516.7
1975	1,012.5	901.5	642.7	613.5	587.6	556.9	488.8	450.7
1976	1,033.6	966.2	676.0	626.2	614.2	605.6	509.4	489.5

5-4 Manufacturing Employment (1) by Sector, 1950-1976 (cont.)
(in thousands)

Year	Manufacturing Industry and SIC Code (2)				
	Miscellaneous Manufacturing Industries (39)	Leather and Leather Products (31)	Petroleum and Coal Products (29)	Ordnance and Accessories	Tobacco Manufactures (21)
1950	400.0	395.0	218.0	30.0	103.0
1955	396.2	385.9	237.1	141.2	102.5
1960	389.9	363.4	211.9	220.0	94.0
1965	419.5	352.9	182.9	225.8	86.8
1970	425.7	320.4	190.8	241.9	82.9
1971	411.7	301.8	192.8	190.8	77.1
1972	433.8	301.9	194.4	182.9	75.0
1973	450.7	290.8	193.4	182.6	79.0
1974	447.6	277.9	198.6	176.5	79.5
1975	404.4	256.8	197.4	170.6	78.3
1976	420.9	271.5	202.8	158.3	76.4

Data include Alaska and Hawaii beginning 1960.

(1) Employees on manufacturing payrolls.

(2) Standard Industrial Classification Code. Numbers in parentheses below sectors are SIC codes.

Sources:
1950-1965: Department of Labor, Bureau of Labor Statistics, Handbook of Labor Statistics, 1975 - Reference Edition, Table 40.
1970-1976: Department of Labor, Bureau of Labor Statistics, Handbook of Labor Statistics, 1977, Table 39.

5-5 Manufacturing Employment (1) by Region, 1950-1976
(in thousands)

Region and State	1950	1955	1960	1965	1970	1971	1972	1973	1974	1975	1976
U.S. Total (2)	15,259	16,875	16,759	18,061	19,393	18,610	18,933	19,820	20,016	18,347	18,956
N.E.:	1,469	1,484	1,452	1,460	1,450	1,345	1,355	1,406	1,418	1,312	1,348
Maine	109	108	105	108	110	103	103	104	105	96	102
N.H.	79	83	87	90	92	85	91	96	95	85	94
Vt.	37	37	35	39	41	38	38	41	43	39	41
Mass.	716	701	698	666	640	604	602	619	618	594	593
R.I.	148	132	120	121	121	114	119	124	126	109	122
Conn.	380	423	407	436	446	401	402	422	431	389	396
M.A.:	4,153	4,328	4,128	4,163	4,161	3,881	3,854	3,935	3,870	3,479	3,525
N.Y.	1,916	2,007	1,879	1,838	1,769	1,635	1,605	1,622	1,581	1,407	1,440
N.J.	756	811	809	836	867	816	815	837	822	736	753
Pa.	1,481	1,510	1,440	1,489	1,525	1,430	1,434	1,476	1,467	1,336	1,332
E.N.C.:	4,494	4,894	4,496	4,895	5,042	4,801	4,883	5,195	5,135	4,605	4,728
Ohio	1,218	1,368	1,263	1,324	1,406	1,329	1,344	1,422	1,415	1,258	1,294
Ind.	580	629	594	674	713	679	708	756	735	644	682
Ill.	1,198	1,275	1,211	1,302	1,344	1,266	1,270	1,321	1,333	1,220	1,199
Mich.	1,063	1,164	968	1,103	1,078	1,049	1,067	1,164	1,106	980	1,041
Wis.	435	458	460	492	501	478	494	529	546	503	512
W.N.C.:	874	986	1,003	1,085	1,223	1,168	1,224	1,308	1,336	1,225	1,256
Minn.	201	216	230	262	320	299	308	331	343	313	318
Iowa	154	171	177	192	214	207	223	241	249	230	231
Mo.	354	389	393	417	444	424	434	455	450	400	416
N. Dak.	6	7	7	9	10	10	11	12	14	16	16
S. Dak.	12	12	13	14	16	16	18	20	21	20	22
Nebr.	52	62	67	69	85	83	87	90	92	85	88
Kans.	95	129	116	122	134	129	143	159	167	161	165
S.A.:	1,681	1,903	2,041	2,349	2,679	2,642	2,741	2,887	2,903	2,632	2,776
Del.	51	59	59	68	72	69	72	73	72	67	69
Md.	233	266	260	265	272	253	248	256	255	230	232
D.C.	19	19	20	20	19	18	17	17	17	15	15
Va.	230	255	275	323	365	362	383	400	401	366	387
W. Va.	131	131	125	129	126	123	123	128	131	120	124
N.C.	418	460	509	596	699	709	736	770	795	737	758
S.C.	210	231	245	293	340	337	354	376	375	336	371
Ga.	287	335	341	403	462	455	473	494	483	433	477
Fla.	102	147	207	252	324	316	335	373	374	328	343

5-5 Manufacturing Employment (1) by Region, 1950-1976 (cont.)

Region and State	1950	1955	1960	1965	1970	1971	1972	1973	1974	1975	1976
E.S.C.:	692	806	845	1,023	1,228	1,213	1,287	1,371	1,383	1,226	1,317
Ky.	140	168	172	206	251	248	266	285	292	254	271
Tenn.	250	297	316	387	467	459	488	522	520	454	487
Ala.	216	236	237	277	324	318	328	346	351	320	340
Miss.	86	105	120	153	186	188	205	218	220	198	219
W.S.C.:	651	791	821	969	1,219	1,186	1,243	1,330	1,375	1,308	1,402
Ark.	76	86	102	134	166	169	184	201	202	176	195
La.	145	155	142	158	176	173	179	183	186	182	192
Okla.	66	89	87	103	135	131	139	150	156	150	156
Tex.	364	461	490	574	742	713	741	796	831	800	859
Mt.:	168	208	263	290	363	363	267	424	447	416	445
Mont.	18	20	20	22	24	24	25	24	25	22	24
Idaho	22	26	29	33	40	41	43	47	47	47	52
Wyo.	6	7	8	7	7	7	8	8	8	8	8
Colo.	62	69	88	90	118	118	N.A.	135	144	135	141
N. Mex.	10	12	17	17	21	21	26	27	29	27	30
Ariz.	17	33	49	65	90	89	97	108	112	98	106
Utah	29	35	47	49	55	55	59	64	70	67	71
Nevada	4	6	5	7	8	8	9	11	12	12	13
Pac.:	1,077	1,475	1,710	1,827	2,014	1,891	1,970	2,123	2,170	2,042	2,118
Wash.	179	208	217	227	241	213	223	245	252	242	243
Oregon	138	146	144	158	172	174	183	197	197	182	193
Calif.	760	1,121	1,317	1,411	1,568	1,471	1,531	1,648	1,688	1,585	1,647
Alaska	-	-	6	6	8	8	8	9	10	9	11
Hawaii	-	-	26	25	25	25	25	24	23	24	24

Regions include New England (N.E.), Middle Atlantic (M.A.), East North Central (E.N.C.), West North Central (W.N.C.), South Atlantic (S.A.), East South Central (E.S.C.), West South Central (W.S.C.), Mountain (Mt.), and Pacific (Pac.).

(1) Includes all full- and part-time employees who worked during, or received pay for, any part of the pay period reported.

(2) Some national totals differ from sum of state figures because of differing benchmarks among states and differing industrial and geographic stratification.

Sources:
1950-1965: Department of Labor, Bureau of Labor Statistics, Handbook of Labor Statistics 1975, Table 49, pp. 122-123.
1970-1976: U.S. Bureau of the Census, Statistical Abstract, annual issues.

5-6 Solid Wastes Disposed of by Manufacturing Industries, 1974-1976
(in thousands of short tons) (1)

SIC Code (2)	Manufacturing Industry	1974	1975	1976
	Total, Manufacturing	133,324.8	139,050.8	156,825.9
28	Chemicals and Allied Products	38,154.6	38,695.2	50,281.9
33	Primary Metal Industries	40,799.9	42,707.6	42,352.8
20	Food Processing	11,500.6	12,640.8	14,965.3
32	Stone, Clay, Glass Products	9,336.8	11,344.8	11,088.4
26	Paper and Allied Products	8,837.1	9,123.0	10,146.3
24	Lumber and Wood Products	6,886.8	8,142.7	9,328.0
37	Transportation Equipment	4,207.1	3,784.6	4,283.5
35	Machinery, Except Electrical	2,713.7	2,719.7	3,066.9
29	Petroleum and Coal Products	2,387.5	2,037.6	2,592.4
34	Fabricated Metal Products	2,127.0	1,932.7	2,089.2
30	Rubber, Miscellaneous Plastic Products	1,704.4	1,404.1	1,676.4
36	Electric, Electronic Equipment	1,533.5	1,500.0	1,500.3
27	Printing and Publishing	617.2	627.9	848.2
22	Textile Mill Products	749.5	668.2	671.2
25	Furniture and Fixtures	516.9	591.8	637.5
38	Instruments, Related Products	552.2	408.6	396.2
31	Leather and Leather Products	233.4	221.3	385.3
39	Miscellaneous Manufacturing Industries	318.6	349.9	351.6
21	Tobacco Products	148.0	150.2	164.3

Data include solid wastes properly disposed of by means acceptable to local, state, and Federal authorities. Recovered materials are excluded.

(1) The aggregated data are composed partially of wet weight and partially of dry weight figures.

(2) Standard Industrial Classification code.

Sources: U.S. Bureau of the Census, Pollution Abatement Costs and Expenditures, 1976, Current Industrial Reports MA-200(76)-2, 1977, Table 4A, and previous annual issues.

5-7 Potentially Hazardous Wastes from 14 Selected Industries, 1974 (1)

Industry	Million Metric Tons/Year (2)	SIC Code (3)
Primary metals, smelting and refining	8.27	33
Organic chemicals, pesticides, and explosives	6.86	2861, 2865, 2869, 2879, 2892
Electroplating	5.28	3471
Inorganic chemicals	3.40	281
Textiles, dyeing and finishing	1.77	22
Petroleum refining	1.76	291
Rubber and plastics	0.79	2821, 2822, 2823, 2824, 3011, 3021, 3031, 3069
Special machinery	0.16	355, 357
Leather tanning	0.15	311
Paint and allied products	0.10	285
Pharmaceuticals	0.07	283
Waste oil re-refining	0.06	N.A.
Electronic components	0.04	N.A.
Batteries	0.01	3691, 3692

(1) Wastes requiring land disposal. These 14 industries account for about 60% of industrial hazardous waste generated.

(2) Measured in wet weight.

(3) Standard Industrial Classification code.

Source: Council on Environmental Quality, Environmental Quality - 1977, p. 47; and Environmental Protection Agency, Office of Soild Waste, Hugh Kaufman, "United States Environmental Protection Agency's Industry Studies on Hazardous Waste Management," presented at the National Conference on Hazardous Waste Management, San Francisco, February 1, 1977, Table 3, p. 9.

5-8 Post-Consumer Municipal Solid Waste Discarded, Recycled, and Disposed of, 1971-1976
(in millions of tons, unless otherwise noted)

Year	Gross Discards (1)	Material Recycled		Net Waste Disposed of
		Quantity	% of Discards	
1971	132.9	8.1	6.1	124.8
1972	139.3	8.8	6.2	130.5
1973	144.2	9.6	6.7	134.6
1974	144.1	9.4	6.5	134.8
1975	136.1	8.0	5.9	128.2
1976	144.7	9.2	6.4	135.5

Post-consumer solid waste includes residential and commercial solid waste. It excludes wastewater treatment sludge (about five million dry weight tons/year), discarded autos and building demolition residues (about 45 million tons/year), and street sweepings.

(1) Details may not add to totals due to rounding.

Sources:
1971-1975: Environmental Protection Agency, Office of Solid Waste, Fourth Report to Congress, Resource Recovery and Waste Reduction, EPA SW-600, 1977, Table 5, p. 18.
1976: Environmental Protection Agency, Office of Solid Waste, unpublished data.

5-9 Post-Consumer Municipal Solid Waste Discarded, Recycled, and Disposed of, by Material Composition, 1976
(in millions of tons, unless otherwise noted) (1)

Material Category	Gross Discards	Material Recycled		Net Waste Disposed of		
		Quantity	Percent	Quantity	% of Total Waste	% of Nonfood Product Waste
Paper	50.4	8.1	16.1	42.3	31.2	50.4
Glass	13.9	0.4	2.7	13.5	10.0	16.1
Metals	12.8	0.6	4.7	12.2	9.0	14.5
Ferrous	(11.2)	(0.5)	(4.5)	(10.7)	(7.9)	(12.7)
Aluminum	(1.2)	(0.1)	(9.2)	(1.1)	(0.8)	(1.3)
Other Nonferrous	(0.4)	(0.0)	(0.0)	(0.4)	(0.3)	(0.5)
Plastics	5.1	0.0	0.0	5.1	3.8	6.1
Rubber	3.1	0.1	3.9	3.0	2.2	3.6
Leather	0.8	0.0	0.0	0.8	0.6	1.0
Textiles	2.1	0.0	0.0	2.1	1.6	2.5
Wood	4.8	0.0	0.0	4.8	3.5	5.7
Other	0.1	0.0	0.0	0.1	---	0.1
Total Nonfood Product Waste	93.1	9.2	9.9	83.9	61.9	100.0
Food Waste	23.0	0.0	0.0	23.0	17.0	
Yard Waste	26.6	0.0	0.0	26.6	19.6	
Misc. Inorganic Wastes	2.0	0.0	0.0	2.0	1.5	
Total	144.7	9.2	6.4	135.5	100.0	

(1) Wet weight.

Source: Environmental Protection Agency, Office of Solid Waste, unpublished data.

5-10 Material Recycled From Post-Consumer Municipal Solid Waste, by Type, 1971-1976
(in thousands of tons, unless otherwise noted)

Material Recycled	1971	1972	1973	1974	1975	1976
Total Materials	8,133.0	8,825.0	9,590.0	9,400.0	7,975.0	9,245.0
% of gross nonfood product waste	9.5	9.6	10.1	10.0	9.3	9.9
% of total post-consumer waste	6.1	6.2	6.7	6.5	5.9	6.4
Paper and Paperboard	7,495.0	8,075.0	8,730.0	8,430.0	6,830.0	8,140.0
% of gross paper and board discards	15.9	16.0	16.5	16.3	15.5	16.1
Aluminum	20.0	30.0	35.0	52.0	87.0	105.0
% of gross aluminum discards	2.4	3.2	3.4	5.0	8.7	9.2
Ferrous Metals (1)	140.0	200.0	300.0	400.0	500.0	500.0
% of gross ferrous discards	1.3	1.4	2.4	3.4	4.4	4.5
Glass	221.0	273.0	306.0	327.0	368.0	380.0
% of gross glass discards	1.8	2.1	2.3	2.5	2.7	2.7
Rubber (including tires and other)	257.0	245.0	219.0	194.0	189.0	120.0
% of gross rubber discards	8.9	7.9	6.8	6.1	6.9	3.9

(1) The Environmental Protection Agency has characterized the data for ferrous metals as highly inferential and preliminary.

Sources:
1971-1975: Environmental Protection Agency, Fourth Report to Congress, Resource Recovery and Waste Reduction, EPA SW-600, Table 6, 1977, p. 19.
1976: Environmental Protection Agency, Office of Solid Waste, unpublished data.

6

HAZARDOUS SUBSTANCES

6-1 Primary Demand (1) of Heavy Metals in the United States, 1954-1977
(in millions of pounds)

Year	Lead	Chromium	Nickel	Arsenic	Cadmium	Mercury	Beryllium
1954	1,336	530	168.4	24.8	7.4	2.8	0.158
1955	1,260	932	174.2	28.6	10.6	3.6	0.310
1956	1,268	1,098	238.6	38.4	12.5	3.7	0.350
1957	1,178	1,058	222.0	34.8	10.8	3.6	0.348
1958	1,072	732	119.8	31.0	7.9	3.6	0.484
1959	1,194	790	184.6	39.8	11.2	3.8	0.660
1960	1,078	706	243.2	37.1	9.8	3.5	0.776
1961	1,388	638	268.4	41.9	9.9	3.6	0.812
1962	1,310	566	255.8	41.2	11.9	4.5	0.708
1963	1,350	850	240.0	43.5	11.3	5.4	0.720
1964	1,302	1,096	264.2	49.9	8.7	5.6	0.502
1965	1,396	1,028	380.8	49.4	10.3	4.5	0.622
1966	1,566	1,128	457.6	48.6	14.4	4.8	0.700
1967	1,498	858	364.8	53.4	11.1	4.5	0.720
1968	1,816	916	315.8	47.8	12.9	4.9	0.706
1969	1,784	960	299.6	41.2	14.3	5.1	0.938
1970	1,658	984	287.2	40.6	9.1	4.1	0.760
1971	1,890	682	284.2	39.3	10.8	3.1	0.830
1972	1,908	1,016	336.0	37.9	12.6	3.1	0.622
1973	2,118	1,096	415.4	48.4	12.5	3.5	0.696
1974	1,862	1,120	438.2	(a)	12.1	4.1	0.418
1975	1,442	744	309.2		6.7	3.4	0.352
1976	1,860	944	333.8		11.9	4.7	0.102
1977	N.A.	1,020(b)	360.0(b)		10.3	4.7(b)	N.A.

N.A. - Not Available.

(1) The amount of new materials entering use is defined as primary demand, which is equal to total consumption of the material minus the amount available from recycled production (primary demand = total consumption - recycled production). Primary demand excludes large amounts of heavy metals released into the atmosphere from processes other than those used in the production of the metal. Large quantities of mercury, for example, are released from coal combustion.

(a) Arsenic data have been withheld since 1973.

(b) Estimated.

Sources: Department of Interior, Bureau of Mines, Mineral Facts and Problems, 1975, Bulletin 667, for Arsenic (1954-1973), for Nickel and Cadmium (1954-1971 only), for Chromium (1954-1972 only), for Beryllium, Lead, and Mercury (1954-1973 only); Department of Interior, Bureau of Mines, Commodity Data Summaries 1977 for Nickel (1972-1973 only), for Beryllium (1974-1975 only), and for Cadmium (1972-1975 only); and Department of Interior, Bureau of Mines, unpublished data, for Chromium (1973-1977), Cadmium (1976-1977), Lead (1974-1976), Mercury (1974-1977), Nickel (1974-1977), and Beryllium (1976).

6-2 Cancer Deaths Associated With Heavy Metal Exposure, 1940-1973

Exposed Population						
Type of Worker	Number of Workers in Study	Period of Study	Observed Cancer Deaths	Expected Cancer Deaths (1)	Type of Cancer	SMR (2)
Cadmium Smelter Workers (3)	292	1940-1973	27	17.51	All cancers	154
			12	5.11	Respiratory	235
Lead Smelter Workers	2,352	1947-1970	69	54.95	All cancers	133
			25	17.63	Digestive organs	150
			22	15.76	Respiratory	148
Lead Battery Plant Workers	4,680	1947-1970	186	180.34	All cancers	111
			61	49.51	Respiratory	132
Arsenic Workers (4)		1940-1972	28 (a)	10.47	Respiratory	267

(1) Expected deaths represent the normal or average number of deaths estimated for the group, accounting for sex, race, and age differences.

(2) The risk of death from cancer is expressed as a Standardized Mortality Ratio (SMR) which is the ratio of the number of observed to expected deaths (based on a standard population) times 100.

(3) Cadmium smelter workers under study were white males with two or more years employment between January 1940 and December 1969.

(4) Arsenic workers were involved in pesticide production.

(a) Of the 28 deaths, 16 involved workers who had been in the exposure area less than one year.

Sources: Lemen, Richard A., et al., "Cancer Mortality Among Cadmium Production Workers"; Cooper, W. Clark, "Cancer Mortality Patterns in the Lead Industry"; and Blejer, Hector P., and Wagner, William, "Case Study 4: Inorganic Arsenic - Ambient Level Approach to the Control of Occupational Carcinogenic Exposures," all reproduced in Annals of the New York Academy of Sciences, Occupational Carcinogenesis, Volume 271, 1976, pp. 276, 254, and 182 respectively.

6-3 Pesticide Production (1) by Type, in the United States, 1950-1977
(in thousands of pounds)

Year	Synthetic Organic Pesticides, Total	Herbicides	Insecticides (2)	Fungicides
1950	286,000	N.A.	N.A.	N.A.
1951	463,998	49,409	318,762	95,827
1955	506,376	N.A.	N.A.	128,628
1960	647,795	102,472	366,224	179,099
1961	699,699	120,953	411,100	167,646
1962	729,718	150,888	461,351	117,479
1963	763,477	174,527	477,886	111,064
1964	782,749	226,386	443,660	112,703
1965	877,197	262,924	490,439	123,834
1966	1,013,110	323,692	552,012	137,406
1967	1,049,663	409,447	495,804	144,412
1968	1,192,360	468,992	569,205	154,163
1969	1,104,381	393,306	570,522	140,553
1970	1,034,075	403,784	490,132	140,159
1971	1,135,717	428,512	557,710	149,495
1972	1,157,698	451,311	563,575	142,812
1973	1,288,952	495,819	639,169	153,964
1974	1,417,158	604,152	650,209	162,797
1975	1,603,016	788,030	659,621	155,365
1976	1,364,391	656,045	566,034	142,262
1977	1,387,519	674,208	570,034	143,277

N.A. - Not Available.

(1) Production data include the total quantity of a commodity made available by the original manufacturers only. Production excludes intermediate products in the manufacturing process.

(2) Insecticides include fumigants, rodenticides, and soil conditioners.

Sources: International Trade Commission, Synthetic Organic Chemicals, annual issues.

6-4 Insecticide Production by Type of Chemical, 1960-1977
(in millions of pounds)

Year	Insecticides Total, (1)	Organophosphorus Insecticides (2)	Organochlorine Insecticides (3)
1960	366	N.A.	N.A.
1961	411	N.A.	N.A.
1962	461	N.A.	N.A.
1963	478	74	285
1964	444	81	229
1965	490	95	260
1966	552	120	272
1967	496	N.A.	224
1968	569	N.A.	255
1969	571	N.A.	N.A.
1970	490	132	148 (a)
1971	558	138	165 (a)
1972	564	161	208 (a)
1973	639	173	220 (a)
1974	650	187	207 (a)
1975	660	213	172 (a)
1976	566	190	150 (a)
1977	570	204	N.A.

N.A. - Not Available.

(1) Total insecticides includes rodenticides, soil conditioners, and fumigants.

(2) Organophosphorus insecticides include acephate, diazinon, fonofos, methyl parathion, parathion, phorate, and others.

(3) Organochlorine insecticides include aldrin, chlordane, DDT, dieldrin, endrin, heptachlor, toxaphene, and others.

(a) Due to rules of confidentiality, organochlorine insecticide data for 1970-1976 were estimated from a graphic prepared by the International Trade Commission contained in Synthetic Organic Chemicals 1976, p. 268.

Sources: International Trade Commission, Synthetic Organic Chemicals, annual issues.

6-5 Herbicide Use on Crops, 1964-1976

Herbicide	1964	1966	1971	1976
Atrazine				
Pounds (1,000)	10,837	23,495	57,219	90,340
Acres (1,000)	7,912	14,978	39,842	61,750
Pounds/acre	1.4	1.6	1.4	1.5
Alachlor				
Pounds (1,000)	N.A.	N.A.	14,754	88,549
Acres (1,000)			11,636	53,533
Pounds/acre			1.3	1.7
2,4-D				
Pounds (1,000)	29,687	39,513	33,252	38,393
Acres (1,000)	56,300	56,893	54,845	58,618
Pounds/acre	0.5	0.7	0.6	0.7
Trifluralin				
Pounds (1,000)	N.A.	5,184	11,427	28,333
Acres (1,000)		6,953	16,613	33,695
Pounds/acre		0.7	0.7	0.8
Propachlor				
Pounds (1,000)	N.A.	2,269	23,730	11,015
Acres (1,000)		1,632	14,848	5,362
Pounds/acre		1.4	1.6	2.1

N.A. - Not Available.

Sources:
1976: U.S. Department of Agriculture, Economics, Statistics, and Cooperatives Service, Farmer's Use of Pesticides in 1976, Agricultural Economic Report No. 418, pp. 36, 38.
1971: U.S. Department of Agriculture, Farmer's Use of Pesticides in 1971 - Quantities, Agricultural Economic Report No. 252, 1974, pp. 9, 40, 41.
1966: U.S. Department of Agriculture, Farmer's Use of Pesticides in 1966, Tables 23 and 25, pp. 37, 38, 44.
1964: U.S. Department of Agriculture, Quantities of Pesticides Used by Farmers in 1964, Agricultural Economic Report No. 131, pp. 19, 20.

6-6 Insecticide Use on Crops, 1964-1976

Insecticide	1964	1966	1971	1976
Toxaphene				
Pounds (1,000)	34,189	30,924	32,867	30,721
Acres (1,000)	8,028	5,383	5,601	4,851
Pounds/acre	4.3	5.8	5.9	6.3
Methyl Parathion				
Pounds (1,000)	9,981	7,991	27,562	22,787
Acres (1,000)	6,723	4,511	12,142	12,075
Pounds/acre	1.5	1.8	2.3	1.9
DDT (1)				
Pounds (1,000)	35,210	29,175	14,249	(a)
Acres (1,000)	12,226	8,896	3,170	
Pounds/acre	2.9	3.3	4.5	
Carbofuran				
Pounds (1,000)	N.A.	N.A.	2,854	11,613
Acres (1,000)			3,772	11,417
Pounds/acre			0.8	1.0
Parathion				
Pounds (1,000)	6,138	8,437	9,372	6,559
Acres (1,000)	4,828	6,140	9,985	12,032
Pounds/acre	1.3	1.4	0.9	0.5
Aldrin/Dieldrin (2)				
Pounds (1,000)	12,046	15,455	8,228	865
Acres (1,000)	14,366	14,551	8,138	460
Pounds/acre	0.8	1.1	1.0	1.9

N.A. - Not Available.

(1) DDT includes its related compound TDE.

(2) Aldrin/dieldrin use in 1976 includes aldrin only. The two are usually grouped together since aldrin rapidly breaks down into its metabolite, dieldrin. Therefore, most residues found in the environment are principally dieldrin.

(a) Use of DDT was prohibited in 1972, with a few minor exceptions.

Sources:
1976: U.S. Department of Agriculture, Economics, Statistics, and Cooperatives Service, Farmer's Use of Pesticides in 1976, Agricultural Economic Report No. 418, pp. 48, 52.
1971: USDA, Farmer's Use of Pesticides in 1971 - Quantities, Agricultural Economic Report No. 252, 1974, pp. 13, 50.
1966: USDA, Farmer's Use of Pesticides in 1966, Tables 28 and 30, pp. 5[illegible], 55.
1964: USDA, Quantities of Pesticides Used by Farmers in 1964, Agricultural Economic Report No. 131, pp. 26, 27.

6-7 Injuries and Accidental Deaths Due to Pesticide Poisoning, 1968-1975

Year	Injuries		Accidental Deaths (3)
	National (1)	California (2)	
1968			72
1969			
1970		1,447	
1971			
1972			38
1973		1,257	32
1974		1,474	35
1975	14,000-30,000		30

(1) National injuries include estimates of nonfatal human poisonings from occupational and other origins, which are treated by the medical profession either in a hospital or a physician's office.

(2) California data are for occupational injuries and deaths only.

(3) National deaths include accidental poisonings (excluding suicides) from pesticides, fertilizers, and plant foods.

Sources:

National Injuries: Pimentel, David, "Pesticides, Insecticides, and Food," Bioscience, March, 1977; and Environmental Protection Agency, unpublished data.

Occupational Injuries, California:

(1970): National Academy of Sciences, Pest Control, Volume 1, 1975, p. 88.

(1973): Durham, William F., "Pesticides and Human Health," paper presented at the American Association for the Advancement of Science (AAAS) Annual Conference, Washington, D.C., February 17, 1978.

(1974): Smith, R. F., and Calvert, D. J., "Health-Related Aspects of Integrated Pest Management," Environmental Health Perspectives, Volume 14, p. 185.

National Deaths: Department of Health, Education and Welfare, Public Health Service, Food and Drug Administration, "National Clearinghouse for Poison Control Centers Bulletin," April, 1977.

6-8 Diet Intake of Pesticides (1), FY 1966 - FY 1974
(in mg/day)

Year	Pesticides, Total	Organochlorine Insecticides	Organophosphorus Insecticides	Carbamates	Herbicides
FY 1966 (2)	0.156	0.112	0.010	0.026	0.008
FY 1967	0.116	0.082	0.017	0.013	0.004
FY 1968	0.084	0.073	0.005	0.002	0.004
FY 1969	0.078	0.057	0.015	0.003	0.003
FY 1970	0.067	0.045	0.018	0.003	0.001
FY 1971	N.A.	N.A.	N.A.	N.A.	N.A.
FY 1972	N.A.	N.A.	N.A.	N.A.	N.A.
FY 1973	0.061	0.017	0.013	0.030	0.001
FY 1974 (3)	0.052	0.024	0.012	0.012	0.001

N.A. - Not Available.

Details may not add to total due to rounding.

(1) Values are determined from analyses of 12 categories of foods prepared from "market basket" samples collected in major U.S. cities and designed to simulate the diet of a 15-20-year-old male.

(2) Data for FY 1966 may not include all pesticides.

(3) Total for FY 1974 does not include 0.004 mg/day of miscellaneous pesticides.

Sources: FY 1973, FY 1974: Department of Health, Education and Welfare, Food and Drug Administration, Bureau of Foods, Compliance Program Evaluation, FY '74 Total Diet Studies (7320.08), published 1977, Table 6.
FY 1966 - FY 1970: Duggan, R. E., and Corneliussen, P. E., "Dietary Intake of Pesticide Chemicals in the United States (III)," Pesticides Monitoring Journal, Volume 5, No. 4, March, 1972, p. 339.

6-9 Pesticide Residues in Agricultural Soils (1), FY 1969 - FY 1974
(ppm dry weight, geometric mean)

	FY69	FY70	FY71	FY72	FY73	FY74
DDTR (2)	.0148	.0125	N.M.	.0131	.0100	.0073
Aldrin	.0031	.0034	N.M.	.0024	.0021	.0008
Dieldrin	.0088	.0104	N.M.	.0097	.0090	.0066
Aldrin/Dieldrin	.0119	.0138	N.M.	.0121	.0111	.0074
Toxaphene	.0025	.0011	N.M.	.0045	.0035	.0017
Chlordane	.0038	.0046	N.M.	.0035	.0034	.0006
Heptachlor	.0008	.0013	N.M.	.0010	.0006	.0003
Heptachlor Epoxide	.0014	.0017	N.M.	.0010	.0012	.0010
Total, Chlordane Heptachlor, Heptachlor Epoxide	.0060	.0076	N.M.	.0055	.0052	.0019

N.M. - Not Measured.

(1) Data were collected from 34 states, except for FY72 where Heptachlor and Heptachlor Epoxide data are from 37 states.

(2) DDTR includes DDT and its related derivatives.

Sources: Environmental Protection Agency, Ecological Monitoring Branch, "Pesticide Residue Levels in Soils and Crops in 1971 (FY 1972) - National Soils Monitoring Program," Table 2; and Environmental Protection Agency, Ecological Monitoring Branch, unpublished data.

6-10 Production of Organochlorines, 1950-1978
(in thousands of pounds)

Year	Vinyl Chloride (1)	Chloroform (1)	PCB's (2)
1950	249,532	20,285	N.A.
1955	528,605	40,396	N.A.
1960	1,036,989	76,426	37,919
1961	1,043,983	77,315	36,515
1962	1,311,489	98,209	38,353
1963	1,435,209	105,149	44,734
1964	1,614,981	119,210	50,833
1965	2,000,000	152,510	60,480
1966	2,499,549	178,953	65,849
1967	2,423,572	190,886	75,309
1968	2,968,897	180,795	82,854
1969	3,735,942	216,168	76,387
1970	4,040,234	239,893	85,054
1971	4,335,782	230,766	40,471
1972	5,088,511	234,677	38,600
1973	5,351,056	252,786	42,178
1974	5,621,191	301,787	41,118
1975	4,196,250	261,740	29,710
1976	5,676,895	291,855	29,592
1977	5,985,912	301,526	13,330
1978	N.A.	N.A.	0

N.A. - Not Available.

(1) Vinyl chloride and chloroform production data include the total quantity of a commodity made available by the original manufacturers only. Production excludes intermediate products in the manufacturing process.

(2) PCB production includes only that produced for domestic sales.

Sources:
Vinyl chloride and chloroform: International Trade Commission, Synthetic Organic Chemicals, annual issues.
PCB's: (1960-1971):
Interdepartmental Task Force on PCB's, PCB's and the Environment, National Technical Information Service Com-72-10419, March, 1972, pp. 6, 7.
(1972-1978): Monsanto, sole producer of PCB's, unpublished data.

6-11 Cancer Deaths Associated With Vinyl Chloride (VC) and Polyvinyl Chloride (PVC) Exposure, 1942-1973

Methods of Exposure	Number of People in Study	Period of Study	Observed Cancer Deaths	Expected Cancer Deaths(1)	Type of Cancer	SMR (2)
Workers Exposed To VC (3)	1,294	1942-1973	35	23.5	All Cancers	149
			12	7.7	Respiratory Cancer	156
			7	0.6	Biliary and Liver Cancer	1,155
Residents of PVC Communities (4)	66,262(a)	1958-1973	38	24.07	Central Nervous System Cancer	158

(1) Expected deaths represent the normal or average number of deaths estimated for the group, accounting for sex, race, and age differences.

(2) The risk of death from cancer is expressed as a Standardized Mortality Ratio (SMR) which is the ratio of the number of observed to expected deaths (based on a standard population) times 100.

(3) For study purposes, workers had at least 5 years work experience in a vinyl chloride or polyvinyl chloride plant and at least 10 years had elapsed since the onset of their initial employment.

(4) PVC communities studied were Ashtabula, Painesville, Avon Lake, and N. Ridgeville, all northern Ohio communities. Observed and expected cancer deaths and standard mortality ratios were developed for residents 45 years and older for the years 1958-1973.

(a) Estimated total population of the four communities in 1972.

Sources: Waxweiler, Richard J., et al., "Neoplastic Risk Among Workers Exposed to Vinyl Chloride," and Infante, Peter F., "Oncogenic and Mutagenic Risks in Communities with Polyvinyl Chloride Production Facilities," both in Annals of the New York Academy of Sciences, Occupational Carcinogenesis, Volume 271, 1976, pp. 43 and 55 respectively.

6-12 Residues of PCB's in Human Tissue, FY 1972 - FY 1975

Year	Sample Size	Percent Detected with PCB's					
		Total	< 1 ppm	1-2 ppm	1-3 ppm	> 2 ppm	> 3 ppm
FY 1972	4,100	74.0	15.5	N.A.	50.7	N.A.	7.9
FY 1973	1,277	75.5	40.2	29.6	N.A.	5.5	N.A.
FY 1974	1,047	90.9	50.6	35.4	N.A.	4.9	N.A.
FY 1975	779	94.3	56.1	N.A.	27.6	N.A.	10.7

FY - Fiscal Year.

N.A. - Not Available.

Details may not add to totals due to rounding.

Sources:
FY 1972 - FY 1974: Kutz and Strassman, "Residues of PCB's in the General Population of the United States," Table 2, p. 142.
FY 1975: Environmental Protection Agency, Ecological Monitoring Branch, unpublished data.

6-13 Production (1) of Other Industrial Chemicals, 1950-1977
(in millions of pounds)

Year	Benzene (2)	Acrylonitrile	Asbestos (3) (primary demand)	Phthalates
1950	1,340.0	N.A.	N.A.	142.6
1955	2,247.7	117.9	1,564	212.8
1960	3,343.0	229.2	1,418	344.7
1961	3,986.7	249.5	1,332	376.5
1962	3,994.2	360.1	1,452	470.0
1963	4,732.6	455.3	1,448	521.9
1964	5,338.0	594.2	1,626	601.4
1965	6,044.7	771.6	1,590	678.7
1966	6,983.0	716.1	1,610	754.5
1967	7,085.9	670.8	1,442	783.9
1968	7,311.0	1,021.0	1,634	840.6
1969	8,664.9	1,156.6	1,568	883.8
1970	8,286.0	1,039.3	1,468	855.1
1971	7,864.9	978.9	1,518	978.2
1972	9,155.4	1,114.7	1,618	1,145.7
1973	10,623.3	1,354.2	1,752	1,203.1
1974	10,879.2	1,411.7	1,634	1,207.3
1975	7,484.8	1,214.6	1,206	903.8
1976	10,418.4	1,517.8	1,452	1,042.9
1977	10,495.3	1,646.0	1,362 (a)	1,202.4

N.A. - Not Available.

(1) Production data for benzene, acrylonitrile, and phthalates include the total quantity of a commodity made available by the original manufacturers only. Production excludes intermediate products in the manufacturing process.
(2) Benzene data converted from gallons to pounds using a conversion factor of 7.31 pounds/gallon.
(3) Primary demand for asbestos is the amount of new materials entering use.

(a) Estimated.

Sources:
Benzene, Acrylonitrile, Phthalates: International Trade Commission, Synthetic Organic Chemicals, annual issues.
Asbestos:
(1954-1971): Department of Interior, Bureau of Mines, Mineral Facts and Problems, 1975, p. 120.
(1972-1975): Department of Interior, Bureau of Mines, Commodity Data Summaries 1977, p. 12.
(1976-1977): Department of Interior, Bureau of Mines, unpublished data.

6-14 Cancer Deaths Associated With Asbestos, 1943-1976

Method of Exposure	Number of People in Study	Period of Study	Observed Cancer Deaths	Expected Cancer Deaths (1)	Type of Cancer	SMR (2)
Asbestos Production & Textile Workers	689	1959-1971	72	27.8	All Cancers	259
			35	8.4	Lung Cancer (3)	417
			13	5.0	Gastrointestinal Cancer (4)	260
			15	(a)	Mesothelioma (5)	
Asbestos Insulation Workers, U.S. & Canada	17,800	1967-1976	994	319.90	All Cancers	311
			485	105.97	Lung Cancer	458
			18	7.01	Esophagus Cancer	257
			175	(a)	Mesothelioma (5)	
Asbestos Insulation Workers, N.Y. & N.J.	623 (b)	1943-1971	189	47.2	All Cancers	400
			84	10.1	Lung Cancer	832
			41	13.0	Gastrointestinal Cancer (6)	315
			32	(a)	Mesothelioma (5)	

(1) Expected deaths represent the normal or average number of deaths estimated for the group, accounting for sex, race, and age differences.

(2) The risk of death from cancer is expressed as a Standardized Mortality Ratio (SMR), which is the ratio of the number of observed to expected deaths (based on a standard population) times 100.

(3) Lung cancer deaths also include cancer of the pleura, trachea, and bronchus.

(4) Gastrointestinal cancer includes cancer of the stomach, colon, and rectum.

(5) Includes both pleural and peritoneal mesothelioma.

(6) Gastrointestinal cancer includes cancer of the stomach, colon, rectum and esophagus.

(a) The U.S. expected death rate is not available. These are rare causes of death in the general population.

(b) Includes N.Y. and N.J. workers on the union's rolls after 1/1/43 who lived twenty or more years after the onset of their first exposure.

Sources: Asbestos Production and Textile Workers:
Nicholson, William J., "Case Study 1: Asbestos - the TLV Approach," Annals of the New York Academy of Sciences, Occupational Carcinogenesis, Volume 271, 1976, p. 156.
Asbestos Insulation Workers (U.S. and Canada):
Memorandum from Irving J. Selikoff, Environmental Sciences Laboratory, Mount Sinai School of Medicine of the City University of New York, to the National Institute of Environmental Health Sciences, "Asbestos-Associated Disease in U.S. Shipyards," November 27, 1977, Table 1.
Asbestos Insulation Workers (New York and New Jersey):
Nicholson, William J., "Case Study 1: Asbestos - the TLV Approach," Annals of the New York Academy of Sciences, Occupational Carcinogenesis, Volume 271, 1976, p. 162.

6-15 Exposure to Radiation in the United States by Source, 1970
(in mrem/person/year)

Source	Exposure (1)
Total, Natural and Manmade	182
Natural	102
Cosmic	44
Terrestrial	58
External	40
Internal	18
Manmade	80
Medical	73
Diagnostic (2)	72
Radiopharmaceuticals	1
Global Nuclear Fallout	4
Industrial/Occupational	0.8
Nuclear Power	0.003
Miscellaneous	2

(1) Exposure refers to the average whole-body dose rate expressed in mrem. The rem is a special unit of radiation dose equivalent. The dose equivalent in rems is numerically equal to the radiation absorbed dose multiplied by the quality factor (the effectiveness of the absorbed dose) and any other modifying factors. A millirem (mrem) is 1/1000 of a rem.

(2) The medical diagnostic rate is based on the abdominal dose.

Source: National Academy of Sciences Advisory Committee on the Biological Health Effects of Ionizing Radiation, Effects on Populations of Exposure to Low Levels of Ionizing Radiation, prepared for the Department of Health, Education and Welfare and the Environmental Protection Agency, November 1972, pp. 12, 19.

6-16 Radioactive Emissions from Nuclear Fallout as Measured by Strontium-90 and Cesium-137 in Pasteurized Milk, 1960-1977 (in pico curies/liter)

Year	Strontium-90	Cesium-137
1960	8.6	18
1961	8.0	11
1962	13.4	44
1963	23.5	108
1964	23.8	109
1965	17.6	58
1966	13.3	29
1967	10.2	16
1968	8.9	11
1969	7.5	9
1970	7.3	8
1971	6.8	9
1972	5.6	6
1973	4.4	5
1974	4.7	8
1975	3.9	9
1976	3.5	7
1977	3.6	6

Data aggregated in network averages.

Source: Environmental Protection Agency, Eastern Environmental Radiation Facility, unpublished data.

6-17 Radiation Levels from Nuclear Power Generation as Measured by Krypton-85 in Air, 1962-1976

Year	Krypton-85 in pico curies/ cubic meter
1962	7.5
1963	9.0
1964	9.5
1965	10.0
1966	11.0
1967	11.5
1968	12.5
1969	13.5
1970	15.4
1971	14.8
1972	14.9
1973	16.7
1974	17.0
1975	17.5
1976	17.3

1962-1969: Levels in dated gas samples estimated from graph.

1970-1976: Observed levels in air samples.

Sources:
1962-1969: Environmental Protection Agency, Office of Radiation Programs, Radiological Quality of the Environment in the United States, 1977, EPA Publication 520/1-77-009, p. 44.
1970-1976: EPA, Eastern Environmental Radiation Facility, unpublished data.

6-18 Radiation Exposures of Special Groups in the U.S. Population

Group Exposed	External Dose		Internal Dose	
	Individual Dose (mrem/y)	Population Dose (person-rem/y)	Individual Dose (mrem/y)	Population Dose (person-rem/y)
OCCUPATIONAL RADIATION				
Ore Miners	N.A.	N.A.	100,000	N.A.
Phosphate Mining & Processing Personnel	10-300	N.A.	6,000 (a)	N.A.
Coal-Fired Electric Generating Station Personnel	N.A.	N.A.	5-70	0.12 - 2,000,000
Oil-Fired Electric Generating Station Personnel	N.A.	N.A.	0.04	15
Nuclear Power Industry Transportation Personnel	N.A.	100-9600 (b)	N.A.	N.A.
Nuclear Reprocessing And Spent Fuel Storage Personnel	6 (c)	23 (c)	14-257 (c)	N.A.
Boiling Water Nuclear Reactor Personnel (1)	1230	N.A.	N.A.	N.A.
Pressurized Water Nuclear Reactor Personnel (2)	1080	N.A.	N.A.	N.A.
All Occupations	0.80 (d)	28,400	N.A.	N.A.
AIRPLANE TRAVEL				
Jet, Per Trip Over the Atlantic (Cosmic)	2.6 (500-crew)	N.A.	N.A.	N.A.
SST, Per Trip Over the Atlantic (Cosmic)	2.0(1000-crew)	N.A.	N.A.	N.A.
RESIDENTIAL RADIATION				
Residents Near Inactive Uranium Mill Tailings Piles	N.A.	N.A.	(a) 140-14000	2.5-70000 (e)
Residents Adjacent to Boiling Water Nuclear Reactors	76 max (f)	1564 (g)	N.A.	N.A.
Residents Adjacent to Pressurized Water Nuclear Reactors	4 max (f)	21 (g)	N.A.	N.A.
Residents Adjacent to Department of Energy Facilities	<0.1-258 (f)	<1-180	N.A.	N.A.
MEDICAL RADIATION				
Recipients of X Radiation	103 (h)	14,800,000	N.A.	N.A.

N.A. - Not Available.

(1) A boiling water reactor is a reactor in which water, used as both coolant and moderator, is allowed to boil in the core. The resulting steam can be used directly to drive a turbine.

(2) A pressurized water reactor is a power reactor in which heat is transferred from the core to a heat exchanger by water kept under high pressure to achieve high temperature without boiling in the primary system. Steam is generated in a secondary circuit. Many reactors producing electric power are pressurized water reactors.

(a) Trachea-bronchial dose.
(b) Estimated for the year 1973.
(c) For uranium Nuclear Fuel Storage Reprocessing Plant, West Valley, N.Y.
(d) Average exposure for all occupations. Includes an estimated 3.7 radiation workers/1000 persons in the United States.
(e) Lung-rem/year.
(f) Fence line boundary dose.
(g) Within a radius of 80 km.
(h) Estimated mean active bone marrow dose to adults-mrad/y.

Source: Environmental Protection Agency, Office of Radiation Programs, Radiological Quality of the Environment in the United States, 1977, EPA publication 520/1-77-009, pp. 5, 6 & 7.

6-19 Relative Risk (1) of Cancer From Radiation, 1915-1974

Exposed Population	Period of Study	Number of Subjects	Type of Radiation	Type of Cancer	Occurrence of Cancer		Relative Risk (1)
					Observed	Expected(2)	
OCCUPATION							
Radium Dial Painters (3)	1915-1935	775	Alpha	Bone Cancer	48(a)	0.39(b)	123
Uranium Miners, Total	1950-1974	4,146	Alpha, Beta	All Cancers	223	103.8	2.15(c)
Uranium Miners, Total		4,146		Respiratory Cancer	155	32.4	4.78(c)
Uranium Miners, White	1950-1974	3,366		All Cancers	206	93.9(d)	2.19(c)
Uranium Miners, White		3,366		Respiratory Cancer	144	29.8(d)	4.83(c)
Uranium Miners, American Indians	1960-1974	780		All Cancers	17	9.9(e)	1.72(c)
Uranium Miners, American Indians		780		Respiratory Cancer	11	2.6(e)	4.23(c)
PATIENT							
Patients with Enlarged Thymus Glands (4)	1926-1957	2,878	X-Ray	Thyroid Cancer	19	0.14	136
Patients with Ankylosing Spondylitis (5)	1935-1954	11,287	X-Ray	Leukemia	32	2.64	12.1
GENERAL POPULATION/ EVENTS							
Survivors of Atomic Bombs at Hiroshima and Nagasaki in 1945 (6)	1950-1970	19,472	Gamma And Neutron	Leukemia	62	16.8	3.7

(1) Relative Risk (RR) is a ratio of risk similar to but not the equivalent of the Standardized Mortality Ratio, a ratio of deaths. The RR is the number of observed cases over the expected cases.

(2) Expected cases represent the normal or average number of cancer cases estimated for the group, accounting for sex, race, and age differences.

(3) U.S. radium dial painters were exposed to radium 226 over a period of years.

6-19 Relative Risk (1) of Cancer From Radiation, 1915-1974 (cont.)

(4) Thymus X-ray patients were studied in upper New York state and had been exposed over a period of minutes to weeks in childhood. The incidence figures (obtained by mail survey) refer to surgically excised thyroid cancers, the histological diagnosis of which has been verified and, in most cases reviewed by the National Academy of Sciences authors.

(5) Ankylosing spondylitis patients in England and Wales were exposed to radiation treatment at the age of 10 or older. The dose was to the total marrow over a period of days to years.

(6) Survivors of the atomic bomb were externally exposed at age 10 or older for less than 10 seconds.

(a) Observed cases do not include three cases of bone sarcoma diagnosed prior to 10 years from first exposure.

(b) Expected cases is based on a mean incidence rate in the U.S. of 15 per million per year, applicable to the period from 1930-1970.

(c) Cancer data for underground uranium miners are for a death rate (observed deaths over expected deaths), not a risk rate of contracting the disease.

(d) Expected death rates for white miners were calculated using the male white population of the United States.

(e) Expected death rates for Indians were calculated using the male non-white population of Arizona and New Mexico.

Sources:

Uranium Miners: Archer, Victor E., et al., "Respiratory Disease Mortality Among Uranium Miners," Annals of the New York Academy of Sciences, Occupational Carcinogenesis, Volume 271, 1976, pp. 282, 284.

Radium Dial Painters, Patients Receiving Thymus X-Rays, Spondylitis Patients and Atomic Bomb Survivors: National Academy of Sciences, Effects on Populations of Exposure to Low Levels of Ionizing Radiation, National Technical Information Service, November, 1972, PB 239 735, pp. 129, 124, and 117 respectively.

7

CROPLAND, FORESTS, AND GRAZING LAND

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7-1 U.S. Cropland, 1949-1978
(in millions of acres)

Cropland Use	1949	1954	1959	1964	1969	1974	1975	1976	1977	1978(1)
Total cropland used for crops (2)	387	380	358	335	333	361	366	370	377	368
Harvested	352	339	317	292	286	322	330	331	337	330
Crop failure	9	13	10	6	6	8	6	9	10	7
Cultivated summer fallow	26	28	31	37	41	31	30	30	30	31
Total cropland excluding pasture	409	399	391	387	384	382	N.A.	N.A.	N.A.	N.A.
Soil improvement and idle cropland	22	19	33	52	51	21	N.A.	N.A.	N.A.	N.A.
Total cropland including pasture	478	465	457	444	472	465	N.A.	N.A.	N.A.	N.A.
Cropland pasture	69	66	66	57	88	83	N.A.	N.A.	N.A.	N.A.
Diverted acres (3)	N.A.	N.A.	22	55	57	N.A.	N.A.	N.A.	N.A.	N.A.

N.A. - Not Available.

(1) Preliminary data.

(2) Includes principal and minor crops.

(3) Acreage diverted or set aside to comply with Federal Farm Supply Management Programs. This acreage is mostly included in the soil improvement and idle cropland category but some is included in the cultivated summer fallow category of cropland.

Sources: U.S. Department of Agriculture, Economic Research Service, Our Land and Water Resources, Miscellaneous Publication No. 1290, 1974, p. 4; U.S. Department of Agriculture, Economics, Statistics, and Cooperatives Service, Major Uses of Land in the United States, Summary for 1974, draft, June 1978, pp. 8 and 12a; and U.S. Department of Agriculture, Economics, Statistics, and Cooperatives Service, unpublished data.

7-2 Cropland Planted and Harvested, by Crop, 1960-1975
(in thousands of acres)

Crop	1960		1970		1975	
	Planted	Harvested	Planted	Harvested	Planted	Harvested
Total, U.S. Cropland (1)	323,874	312,166	293,312	283,185	334,174	325,595
Food Grains	59,017	55,162	52,935	46,806	78,261	73,272
Wheat	54,906(a)	51,879	48,739(a)	43,564	75,095(a)	69,656
Rye	4,111(b)	1,688	4,196(b)	1,427	3,166(b)	814
Rice	N.A.	1,595	N.A.	1,815	N.A.	2,802
Feed Grains	147,969	127,467	118,765	99,289	123,089	104,750
Corn	81,425	71,422	66,849	57,358	77,902	66,905
Oats	31,419(c)	26,588	24,469(c)	18,638	17,386(c)	13,650
Barley	15,527(c)	13,856	10,490(c)	9,725	9,526(c)	8,711
Sorghum (2)	19,598	15,601	16,957	13,568	18,275	15,484
Oilseeds (excluding cottonseed)	29,403	28,392	47,560	46,564	57,721	56,610
Flaxseed	3,437	3,342	2,963	2,848	1,612	1,500
Peanuts	1,526	1,395	1,515	1,467	1,532	1,504
Soybeans	24,440	23,655	43,082	42,249	54,577	53,606
Vegetables, Melons, Fruits Treenuts, Potatoes	N.A.	7,587	N.A.	7,740	N.A.	7,975
Vegetables, Melons (3)	N.A.	3,383	N.A.	3,198	N.A.	3,381
Fruits, Treenuts (4)	N.A.	2,818	N.A.	3,121	N.A.	3,332
Potatoes	1,400	1,386	1,450	1,421	1,302	1,262
Hay, Seed, Minor Field Crops	N.A.	72,305	N.A.	65,421	N.A.	65,366
Hay	N.A.	67,313	N.A.	61,492	N.A.	61,863
Seeds, Minor Field Crops (5)	N.A.	4,992	N.A.	3,929	N.A.	3,503
Cotton, Sugar, Tobacco	N.A.	17,845	N.A.	14,056	N.A.	12,171
Cotton	16,080	15,309	11,945	11,155	9,493	8,796
Sugarcane	N.A.	437	N.A.	584	N.A.	773
Sugarbeets	976	957	1,483	1,419	1,591	1,516
Tobacco	N.A.	1,142	N.A.	898	N.A.	1,086

N.A. - Not Available.

(1) Principal crops only. Details do not add to totals because some principal crop acreages are not included in the breakdowns.
(2) Planted includes grain and sweet sorghum for all uses, including syrup.
(3) Includes area partially harvested or not harvested because of low prices or other economic factors.
(4) Refers to bearing area.
(5) Includes dry beans and peas, popcorn, peppermint and spearmint, and field seeds.

(a) Includes area seeded in preceding fall for harvest in year shown.
(b) Includes rye sown in preceding fall and in the spring of the year shown.
(c) All purposes, including sown in preceding fall.

Sources: U.S. Department of Agriculture, Agriculture Statistics, annual issues; and U.S. Department of Agriculture, Economics, Statistics and Cooperatives Service, unpublished data.

7-3 Agricultural Inputs, 1950-1977

Year	Cropland Used for Crops (million acres)	Average Size of Farms (1) (acres)	Hours Used for Farmwork (2) (millions)	Horsepower of Farm Machines (3) (millions)	Fertilizer (4) (thousands of tons)	Synthetic Organic Pesticides (5) (million pounds)	Irrigated Land (million acres)			Farm Energy Use (7) (trillion Btu)
							Total U.S.	17 Western States (6)	All Other States	
1950	377	213	15,137	93	4,058	286	25.8	24.3	1.5	1,203.9
1951	381	222	15,222	101	4,728	464	N.A.	N.A.	N.A.	-
1952	380	232	14,504	108	5,205	-	N.A.	N.A.	N.A.	-
1953	380	242	13,966	115	5,646	-	N.A.	N.A.	N.A.	-
1954	380	251	13,310	121	5,896	-	29.6	27.0	2.6	1,303.9
1955	378	258	12,808	126	6,109	506	N.A.	N.A.	N.A.	-
1956	369	265	12,028	134	6,055	-	N.A.	N.A.	N.A.	1,413.8
1957	358	273	11,059	139	6,377	-	N.A.	N.A.	N.A.	-
1958	355	280	10,548	144	6,512	-	N.A.	N.A.	N.A.	-
1959	358	288	10,301	150	7,414	-	33.2	30.7	2.4	-
1960	355	297	9,795	153	7,463	648	N.A.	N.A.	N.A.	1,484.0
1961	340	305	9,400	158	7,844	700	N.A.	N.A.	N.A.	-
1962	331	314	8,979	162	8,448	730	N.A.	N.A.	N.A.	-
1963	337	322	8,664	167	9,505	763	N.A.	N.A.	N.A.	-
1964	335	332	8,194	172	10,460	783	37.1	33.2	3.9	1,747.9
1965	336	340	7,335	176	10,987	877	N.A.	N.A.	N.A.	-
1966	332	348	6,858	182	12,445	1,013	N.A.	N.A.	N.A.	-
1967	340	355	6,677	189	13,974	1,050	N.A.	N.A.	N.A.	-
1968	335	363	6,416	195	15,035	1,192	N.A.	N.A.	N.A.	1,995.9
1969	333	369	6,198	199	15,515	1,104	39.1	34.8	4.3	-
1970	332	373	5,986	203	16,068	1,034	N.A.	N.A.	N.A.	-
1971	340	377	5,741	206	17,168	1,136	N.A.	N.A.	N.A.	2,087.6
1972	334	381	5,433	209	17,212	1,158	N.A.	N.A.	N.A.	-
1973	352	383	5,321	212	18,029	1,289	N.A.	N.A.	N.A.	-
1974	361	384	5,178	219	19,338	1,417	41.2	36.6	4.6	-
1975	366	387	4,990	222	17,572	1,603	N.A.	N.A.	N.A.	-
1976	370	390	4,807	228	20,849	1,364	N.A.	N.A.	N.A.	-
1977	377	393(a)	4,659(a)	232	22,097(a)	1,388	N.A.	N.A.	N.A.	-

N.A. - Not Available.

(1) Mean.

(2) Includes crops, livestock, overhead. After 1964, time used for horses, mules and farm gardens was excluded.

(3) Includes tractors only (exclusive of steam and garden).

(4) Includes nitrogen, phosphate, and potash nutrients used.

(5) Includes production data only.

7-3 Agricultural Inputs, 1950-1977 (cont.)

(6) Western states include Texas, Oklahoma, Kansas, Nebraska, S. Dakota, N. Dakota, Montana, Wyoming, Colorado, New Mexico, Airzona, Utah, Idaho, Washington, Oregon, Nevada, and California.

(7) Btu's converted from kilocalories (kcal), as published in Steinhart, J. S., and Steinhart, C. E., "Energy Use in the Food System," Science, Vol. 184, April 19, 1974. (1 kcal. = 3.968 Btu's; 1 Btu = .252 kcal.) Includes fuel, electricity, fertilizer, agricultural steel, farm machinery, tractors, and irrigation.

(a) Preliminary data.

Sources:
Cropland: U.S. Department of Agriculture, Economics, Statistics, and Cooperatives Service, Changes in Farm Production and Efficiency, 1977, Statistical Bulletin No. 612, 1978, p. 19; and U.S. Department of Agriculture, Economics, Statistics, and Cooperatives Service, unpublished data.
Average Size of Farms:
1950-1958: U.S. Bureau of the Census, Statistical Abstract, 1975, p. 609.
1959-1977: U.S. Department of Agriculture, Agricultural Statistics, 1977, p. 422.
Hours Used for Farmwork: U.S. Department of Agriculture, Economics, Statistics, and Cooperatives Service, Changes in Farm Production and Efficiency, 1977, Statistical Bulletin No. 612, 1978, p. 32.
Horsepower of Farm Machines: U.S. Department of Agriculture, Economics, Statistics, and Cooperatives Service, Changes in Farm Production and Efficiency, 1977, Statistical Bulletin No. 612, 1978, p. 31.
Fertilizer: U.S. Department of Agriculture, Economics, Statistics, and Cooperatives Service, Changes in Farm Production and Efficiency, 1977, Statistical Bulletin No. 612, 1978, p. 27.
Synthetic Organic Pesticides: International Trade Commission, Synthetic Organic Chemicals, annual issues.
Irrigated Land: U.S. Bureau of the Census, Historical Statistics, Colonial Times to 1970, p. 433; and U.S. Bureau of the Census, 1974 Census of Agriculture, Volume II, Part 9, 1978, pp. 1-10.
Farm Energy Use: U.S. Department of Agriculture, Economic Research Service, The U.S. Food and Fiber Sector: Energy Use and Outlook, committee print prepared for the Subcommittee on Agricultural Credit and Rural Electrification of the Committee on Agriculture and Forestry, U.S. Senate, 93rd Congress, second session, September 20, 1974, p. 2.

7-4 Energy Use in the U.S. Food System, 1940-1970
(in trillions of Btu's) (1)

Use	1940	1947	1950	1954	1958	1960	1964	1968	1970
On the Farm:									
Fuel	277.8	539.6	626.9	685.7	710.3	746.0	848.8	895.8	920.6
Electricity	2.8	127.0	130.5	158.7	174.6	182.9	198.4	227.4	253.2
Fertilizer	49.2	77.4	95.2	121.4	127.8	162.7	238.1	345.2	373.0
Agricultural steel	6.3	7.9	10.7	9.9	7.9	6.7	9.9	9.5	7.9
Farm machinery	35.7	137.7	119.0	117.1	199.2	206.3	238.1	297.6	317.4
Tractors	50.8	99.2	122.2	93.6	65.1	46.8	79.4	81.3	76.6
Irrigation	71.4	90.5	99.2	117.5	129.0	132.1	135.3	138.1	138.9
Total	493.6	1,079.3	1,203.9	1,303.9	1,413.8	1,484.0	1,747.9	1,995.9	2,087.6
For Processing:									
Food proc. industry	583.3	704.3	751.9	839.2	843.6	888.8	988.0	1,170.6	1,222.1
Food proc. machinery	2.8	22.6	19.8	19.4	19.4	19.8	23.8	23.8	23.8
Paper packaging	33.7	58.7	67.5	79.4	103.2	111.1	123.0	141.7	150.8
Glass containers	55.6	102.6	103.2	107.1	119.8	123.0	134.9	166.3	186.5
Steel aluminum & cans	150.8	221.4	246.0	292.4	338.9	341.2	361.1	445.2	484.1
Transport (fuel)	196.8	341.7	404.7	485.3	556.3	608.3	730.1	899.1	979.7
Trucks and Trailers (manufacture)	111.1	166.7	196.4	186.5	170.6	175.4	242.0	278.6	293.6
Total	1,133.7	1,617.0	1,799.5	2,009.0	2,151.8	2,267.7	2,603.0	3,125.2	3,340.7
In Commercial Establishments and the Home:									
Commercial refrigeration and cooking	480.1	559.5	595.2	638.8	698.4	738.8	829.3	956.3	1,043.6
Refrigeration machinery (home & commercial)	39.7	95.2	99.2	109.1	116.7	127.0	158.7	222.2	242.0
Home refrigeration and cooking	572.2	730.1	802.7	904.7	1,019.8	1,097.5	1,369.0	1,721.7	1,904.6
Total	1,092.0	1,384.8	1,497.1	1,652.7	1,834.8	1,963.4	2,357.0	2,900.2	3,190.3
Total, All Uses	2,719.3	4,081.1	4,500.5	4,965.6	5,400.4	5,715.1	6,708.0	8,021.3	8,618.4

Details may not add to total due to rounding.

(1) Btu's were converted from kilocalories, as published in Steinhart, J. S., and Steinhart, C. E., "Energy Use in the Food System," Science, Volume 184, April 19, 1974, p. 309. (1 Kcal = 3.968 Btu's; 1 Btu = .252 kcal.)

Source: U.S. Department of Agriculture, Economic Research Service, The U.S. Food and Fiber Sector: Energy Use and Outlook, committee print prepared for the Subcommittee on Agricultural Credit and Rural Electrification of the Committee on Agriculture and Forestry, U.S. Senate, 93rd Congress, second session, September 20, 1974, p. 2.

7-5 Farm Output as a Function of Energy Input to the U.S. Food System, 1940-1975

Year	Index of Farm Output (1)	Energy Input to Food System (trillions of kilocalories) (2)
1940	60	685.5
1947	69	1,028.6
1950	74	1,134.2
1954	79	1,251.5
1958	86	1,361.0
1960	91	1,440.2
1961	90	N.A.
1962	91	N.A.
1963	95	N.A.
1964	94	1,690.5
1965	98	N.A.
1966	96	N.A.
1967	100	N.A.
1968	102	2,021.5
1969	103	N.A.
1970	101	2,172.0
1971	111	N.A.
1972	110	N.A.
1973	112	N.A.
1974	108	N.A.
1975	111	N.A.

(1) 1967 = 100. Annual production available for eventual human use.

(2) 1 kilocalorie (kcal.) = 3.968 Btu's.

Sources:
Farm Output: U.S. Bureau of the Census, Historical Statistics, Colonial Times to 1970, Series K 414, pp. 498-499; and U.S. Bureau of the Census, Statistical Abstract 1977, Table 1105, p. 653.
Energy Input: Steinhart, J. S., and Steinhart, C. E., "Energy Use in the U.S. Food System," Science, Volume 184, No. 4134, April 19, 1974, p. 309.

7-6 Cropland Soil Erosion Due to Water, 1975

Region (1)	Cropland (2) (thousand acres)	Annual Soil Losses (3)			
		Existing Average Soil Losses (tons/acre)	Existing Soil Losses With Present Farming Systems (million tons)	Potential Soil Losses Without Conservation Treatment (million tons)	Maximum Soil Losses Based on SCP Standards (4) (million tons)
New England	1,042	7	7	8	5
Mid-Atlantic	8,556	14	120	156	43
South Atlantic-Gulf	18,827	18	345	496	94
Great Lakes	21,385	5	107	114	107
Ohio	25,904	9	222	293	130
Tennessee	2,814	19	57	69	14
Upper Mississippi	53,873	10	515	604	269
Lower Mississippi	17,626	23	388	492	86
Souris-Red Rainy	17,444	2	39	51	39
Missouri Basin	80,420	7	577	908	402
Arkansas-White-Red	35,152	6	211	332	176
Texas-Gulf	21,708	7	158	211	109
Rio Grande	2,195	2	5	8	5
Upper Colorado	862	2	2	2	2
Lower Colorado	1,268	2	2	2	2
Great Basin	1,687	2	4	5	4
Pacific Northwest	15,064	2	36	43	36
California	9,344	1	5	6	5
Total and Average	335,171	9	2,800	3,800	1,528

(1) Water Resource Council regions.

(2) Includes cropland harvested and crop failure. Estimated by the Soil Conservation Service using the Conservation Needs Inventory of 1967 and the Potential Cropland Study of 1975.

(3) Rates and total tons were computed in a model using nationally consistent procedures. The values may differ from some local estimates.

(4) SCP refers to "sustained crop production" standards as determined by the Soil Conservation Service. This level ranges from 1 to 5 tons per acre per year, depending on the soil.

Source: U.S. Department of Agriculture, Soil Conservation Service, Cropland Erosion, 1977, Tables 3 and 8, pp. 17 and 23.

7-7 Forest Types (1), 1970 and 1977

Type	1970		1977 (2)	
	Total Area (thousand acres)	Percent of Total Forest	Total Area (thousand acres)	Percent of Total Forest
Eastern (3)				
Softwood types (4):				
Loblolly-Shortleaf Pine	52,832	10.7	49,911	10.2
Longleaf-Slash Pine	18,315	3.7	17,016	3.4
Spruce-Fir	18,913	3.8	18,286	3.7
White-Red-Jack Pine	12,168	2.5	12,294	2.5
Total	102,228	20.7	97,507	20.0
Hardwood Types (5):				
Oak-Hickory	111,861	22.6	110,809	22.7
Oak-Pine	35,028	7.1	34,550	7.1
Oak-Gum-Cypress	30,630	6.2	26,914	5.5
Maple-Beech-Birch	31,140	6.3	32.940	6.8
Elm-Ash-Cottonwood	24,728	5.0	25,249	5.2
Aspen-Birch	20,484	4.1	19,634	4.0
Total	253,871	51.3	250,096	51.3
Nonstocked	14,343	2.9	11,599	2.4
Total Eastern	370,442	74.9	359,203	73.6
Western (3)				
Softwood Types (4):				
Douglas Fir	30,788	6.2	30,629	6.3
Ponderosa Pine	27,964	5.6	26,649	5.5
Fir-Spruce	17,830	3.6	19,844	4.1
Lodgepole Pine	13,235	2.7	12,735	2.6
Hemlock-Sitka Spruce	10,819	2.2	13,226	2.7
Larch	2,743	.5	2,424	.5
White Pine	829	.2	446	.1
Redwood	803	.2	662	.1
Total	105,011	21.2	106,615	21.9
Hardwood Types (5):	12,818	2.6	14,994	3.1
Nonstocked	6,379	1.3	6,408	1.3
Total Western	124,208	25.1	128,523(a)	26.3
Total, All Groups	494,650(b)	100.0	487,726	100.0

7-7 Forest Types (1), 1970 and 1977 (cont.)

(1) Forest types describe associations of tree species, which in turn reflect factors of site, climate and stand history. The forest type groups presented are combinations of more than 80 local forest types traditionally used for forest management purposes. Classifications are based upon the tree species presently forming a plurality of stocking. Data are for total commercial forest, all ownerships.

(2) Preliminary data.

(3) Eastern includes the Forest Service's North and South regions. States included are North Dakota, part of South Dakota, Nebraska, Kansas, Oklahoma, Texas, and all states east of these states. Western includes the Forest Service's Rocky Mountain and Pacific Coast regions. States included are Montana, Wyoming, part of South Dakota, Colorado, New Mexico, and all states west of these states, including Alaska and Hawaii.

(4) Softwoods: Coniferous trees, usually evergreen, having needles or scale-like leaves.

(5) Hardwoods: Dicotyledonous trees, usually broad-leaved and deciduous.

(a) Includes other western softwoods not previously classified.

(b) Not included are 5 million acres of "unregulated" commercial timberlands on National Forests in the Rocky Mountain states.

Sources:
1970: U.S. Department of Agriculture, Forest Service, The Outlook for Timber in the United States, Forest Resource Report No. 20, 1974, p. 12.
1977: U.S. Department of Agriculture, Forest Service, Forest Statistics of the U.S., 1977, Tables 4 and 5, pp. 12 and 17.

7-8 Ownership of Forest Land, by Region, 1977
(in millions of acres, unless otherwise noted)

Ownership	Total United States		North (1)	South (2)	Rocky Mountain (3)	Pacific Coast (4)
	Area	Percent of Total				
Total Forest Land (5)	740.1	100.0	180.8	207.1	137.7	214.5
Commercial Forest Land (6)	487.7	65.9	170.8	188.4	57.8	70.8
Public	136.6	18.5	31.3	17.7	43.2	44.4
Federal, Total	99.7	13.5	11.2	17.7	38.2	36.0
National Forest	89.0	12.0	10.1	11.0	36.4	31.5
Bureau of Land Management	5.8	0.8	15.3	3.1	1.7	4.1
Bureau of Indian Affairs	6.1	0.8	1.0	0.2	2.7	2.2
Other Federal	4.8	0.6	1.1	3.3	0.1	0.4
State	23.6	3.1	13.1	2.5	2.2	5.8
Local (county and municipal)	7.2	1.0	5.9	.7	0.1	0.5
Private	351.1	47.4	139.5	170.7	14.6	26.4
Forest Industry	68.0	9.2	17.8	35.8	2.1	12.3
Farm	116.8	15.8	45.4	57.2	8.3	5.9
Small holdings (misc.)	166.4	22.5	76.2	77.7	4.2	8.2
Other Forest Land	252.4	34.1	10.1	18.6	80.0	143.7
Productive-reserved (7)	19.5	2.6	5.1	1.9	8.4	4.1
Deferred (8)	4.6	0.6	0.2	0.1	3.2	1.2
Noncommercial (9)	228.3	30.8	4.8	16.7	68.4	138.4

All data are preliminary.

(1) Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York, Pennsylvania, New Jersey, Delaware, Maryland, West Virginia, Ohio, Kentucky, Indiana, Michigan, Illinois, Missouri, Iowa, Minnesota, Wisconsin, Kansas, Nebraska, South Dakota, and North Dakota.

(2) Virginia, North Carolina, South Carolina, Georgia, Florida, Tennessee, Alabama, Mississippi, Arkansas, Louisiana, Oklahoma, and Texas.

(3) Montana, Wyoming, Idaho, Nevada, Utah, Colorado, Arizona, and New Mexico.

(4) Washington, Oregon, California, Alaska, and Hawaii.

(5) Land at least 10 percent stocked by forest trees of any size, or formerly having had such cover and not currently developed for nonforest use.

(6) Land producing or capable of producing timber on a commercial basis and not withdrawn from timber use. Commercial areas must be able to produce more than 20 cubic feet/acre/year of timber.

(7) Areas that have been permanently exempted from timber harvest to be used as wildlife habitat, watershed protection, Wilderness and Primitive areas, and Wild and Scenic Rivers.

(8) National Forest land that meets productivity standards for commercial forestland but is under study for possible inclusion in the Wilderness System.

(9) Other unproductive forest land.

Source: U.S. Department of Agriculture, Forest Service, Forest Statistics of the U.S., 1977, Tables 1 and 2, pp. 2 and 8.

7-9 Sawtimber Growth and Removal (1), by Type and Ownership, 1952-1976 (in billions of board feet) (2)

Type	Total All Ownerships				National Forest				Other Public (3)				Forest Industry				Farm and Misc. Private			
	1952	1962	1970	1976	1952	1962	1970	1976	1952	1962	1970	1976	1952	1962	1970	1976	1952	1962	1970	1976
Total Growth, Softwood and Hardwood	45.0	54.2	65.0	73.6	7.7	9.2	11.3	12.7	4.0	5.0	5.8	6.8	9.5	11.3	13.6	14.5	23.8	28.6	34.3	39.6
Total Removal, (4) Softwood and Hardwood	52.2	51.4	62.5	66.2	6.7	11.0	13.4	12.5	2.7	3.6	4.9	5.8	17.2	14.5	18.5	21.3	25.5	22.2	25.7	26.5
Softwood:																				
Growth	29.4	36.0	43.2	49.1	6.8	8.0	9.9	11.0	11.3	3.0	3.6	4.0	7.8	9.2	10.8	11.3	11.8	15.3	18.4	22.1
Removal	39.1	38.7	47.1	51.7	6.4	10.7	12.9	12.0	2.3	3.2	4.3	5.0	15.6	12.7	16.4	19.3	14.9	12.0	13.6	15.3
Hardwood:																				
Growth	15.6	18.1	21.8	24.3	.9	1.2	1.3	1.7	1.0	1.5	1.7	2.1	1.7	2.1	2.9	3.2	12.0	13.3	16.0	17.4
Removal	13.0	12.7	15.4	14.5	.4	.4	.6	.6	.4	.4	.6	.7	1.6	1.8	2.0	2.0	10.7	10.2	12.1	11.2

All data are preliminary. Details may not add to totals due to rounding.

(1) Sawtimber is defined as live trees of commercial species containing at least one twelve foot saw log or two noncontiguous eight foot logs. Softwood must be a minimum of nine inches in diameter except in the West, where the minimum is eleven inches. Hardwood must be eleven inches in diameter in all states.

(2) Measured using the international 1/4-inch log rule.

(3) Includes Bureau of Land Management, Bureau of Indian Affairs, other Federal, state, county, and municipal lands.

(4) Volume of growing stock trees removed from the inventory by harvesting, cultural operations (such as timber-stand improvement), land clearing, or changes in land use.

Source: U.S. Department of Agriculture, Forest Service, Forest Statistics of the U.S., 1977, Tables 34 and 35, pp. 84, 86.

7-10 Sawtimber Growth and Removal (1) by Region and Ownership, 1977
(in board feet per acre)

Ownership	Total U.S.		North (2)		South (3)		Rocky Mountain (4)		Pacific Coast (5)	
	Growth	Removal	Growth	Removal	Growth	Removal	Growth	Removal	Growth	Removal
Total	150	135	82	51	193	140	114	83	17	37
National Forest	143	140	100	50	273	146	128	75	87	248
Other Public	142	121	86	24	200	114	86	71	231	308
Forest Industry	213	313	94	72	222	217	200	500	300	933
Farm and Miscellaneous Private	141	94	78	52	184	122	77	46	214	221

All data are preliminary.

(1) Volume of growing stock trees removed from the inventory by harvesting, cultural operations (such as timber-stand inprovement), land clearing, or changes in land use.

(2) Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York, Pennsylvania, New Jersey, Delaware, Maryland, West Virginia, Ohio, Kentucky, Indiana, Michigan, Illinois, Missouri, Iowa, Minnesota, Wisconsin, Kansas, Nebraska, South Dakota, and North Dakota.

(3) Virginia, North Carolina, South Carolina, Georgia, Florida, Tennessee, Alabama, Mississippi, Arkansas, Louisiana, Oklahoma, and Texas.

(4) Montana, Wyoming, Idaho, Nevada, Utah, Colorado, Arizona, and New Mexico.

(5) Washington, Oregon, California, Alaska, and Hawaii.

Source: U.S. Department of Argiculture, Forest Service, Forest Statistics of the U.S., 1977, Tables 3, 34 and 35, pp. 9, 83 and 85.

7-11 Roundwood Removal (1) by Product, 1950-1976
(in billions of cubic feet) (2)

Year	Total, All Roundwood Products	Lumber	Plywood and Veneer	Pulp Products	Miscellaneous Products (2)	Fuel Wood, Including Consumption
1950	10.8	5.9	0.3	1.5	0.8	2.3
1951	11.0	5.7	0.4	1.8	0.7	2.2
1952	10.8	5.8	0.4	1.8	0.7	2.0
1953	10.7	5.7	0.5	1.9	0.7	1.9
1954	10.6	5.6	0.5	2.0	0.7	1.8
1955	11.0	5.8	0.6	2.2	0.6	1.7
1956	11.3	5.9	0.6	2.5	0.6	1.7
1957	10.2	5.1	0.6	2.4	0.6	1.6
1958	10.0	5.1	0.6	2.2	0.6	1.5
1959	10.8	5.7	0.7	2.4	0.5	1.4
1960	10.2	5.1	0.7	2.6	0.5	1.3
1961	10.0	4.9	0.8	2.5	0.5	1.2
1962	10.2	5.1	0.8	2.6	0.5	1.1
1963	10.6	5.3	0.9	2.7	0.5	1.1
1964	11.2	5.6	1.0	2.9	0.5	1.0
1965	11.5	5.7	1.0	3.1	0.6	0.9
1966	11.5	5.6	1.0	3.2	0.6	0.8
1967	11.2	5.3	1.0	3.2	0.5	0.8
1968	11.7	5.6	1.1	3.4	0.5	0.7
1969	11.6	5.5	1.0	3.6	0.5	0.6
1970	11.7	5.4	1.1	3.8	0.4	0.5
1971	11.6	5.5	1.2	3.6	0.5	0.5
1972	11.9	5.6	1.4	3.5	0.5	0.5
1973(3)	12.3	5.7	1.3	3.7	0.5	0.5
1974(3)	11.8	5.1	1.1	4.1	0.5	0.5
1975(3)	10.7	4.9	1.1	3.4	0.4	0.5
1976(3)	12.1	5.6	1.3	3.7	0.5	0.5

(1) Volume of growing stock trees removed from the inventory by harvesting, cultural operations (such as timber-stand improvement), land clearing, or changes in land use.

(2) Includes cooperage logs, poles, piling, fence posts, hewn ties, round mine timbers, box bolts, excelsior bolts, chemical wood, shingle bolts, and other miscellaneous items.

(3) Preliminary data.

Sources:
1950-1969: U.S. Department of Agriculture, Forest Service, The Outlook for Timber in the United States, Forest Resource Report No. 20, 1974, p. 361.
1970-1976: U.S. Department of Agriculture, Forest Service, The Demand and Price Situation for Forest Products, 1976-1977, p. 39.

7-12 Final Uses of Wood, 1962-1976

	Lumber (1) Consumption (million board feet) (4)			Plywood (2) Consumption (million square feet) (5)			Board (3) Consumption (million square feet) (5)		
	1962	1970	1976(6)	1962	1970	1976(6)	1962	1970	1976(6)
Total use	37,300	39,500	N.A.	11,716	17,822	N.A.	N.A.	9,608	N.A.
By species group:									
Softwoods	30,800	32,100	37,200	9,311	14,038	16,794	N.A.	N.A.	N.A.
Hardwoods	6,500	7,300	6,900	2,404	3,784	3,691	N.A.	N.A.	N.A.
By end use:									
New housing	13,940	12,270	N.A.	4,180	6,330	N.A.	N.A.	2,760	N.A.
Residential upkeep and improvements	4,400	4,690	N.A.	1,030	2,510	N.A.	N.A.	1,415	N.A.
New nonresidential construction	3,930	3,690	N.A.	1,280	1,700	N.A.	N.A.	960	N.A.
Manufacturing	4,240	4,670	N.A.	1,870*	1,656*	N.A.	N.A.	1,790	N.A.
Shipping	4,340	5,720	N.A.	N.A.	N.A.	N.A.	N.A.	2,683	N.A.
All other uses (7)	6,450	8,460	N.A.	3,356	5,626	N.A.	N.A.	9,608	N.A.
	(board feet)	(board feet)	(board feet)	(square feet)	(square feet)			(square feet)	
Per capita average use	200	193	205	63	87	N.A.	N.A.	47	N.A.

N.A. - Not Available.

(1) Solid wood product cut directly from log and milled to specified dimensions, i.e., 2" x 4", 1" x 12", 4" x 4", etc.

(2) Wood product formed with marginal wood materials on the interior and higher grade materials on the exterior, held together with glue. Available in 4' x 8' sheets.

(3) Includes insulation board, hardboard and particleboard. Generally produced by combining a wood product such as chips or sawdust with chemicals. Available in 4' x 8' sheets.

(4) Board feet is a three-dimensional measurement used for sawtimber and lumber, consisting of a 12" x 12" x 1" piece of wood.

(5) Square feet is a surface measurement standardized to 3/8" for measuring boards (particleboard, hardboard, and plywood, etc.)

(6) Preliminary data.

7-12 Final Uses of Wood, 1962-1976 (cont.)

(7) Includes railroad ties laid as replacements in existing track (lumber only); upkeep and improvement of nonresidential buildings and structures; farm construction, except housing; shipping (plywood and board only); mining; made-at-home-projects such as furniture, boats, and picnic tables; made-on-the-job products such as advertising and display structures; and a wide variety of other miscellaneous products and uses.

* Includes veneer.

Sources:
1962-1970: U.S. Department of Agriculture, Forest Service, The Outlook for Timber in the United States, Forest Resource Report No. 20, 1974, pp. 181, 183 and 186.
1976: U.S. Department of Agriculture, Forest Service, The Demand and Price Situation for Forest Products, 1976-1977, Miscellaneous Publication No. 1357, pp. 65, 77.

7-13 Forest Area Burned, 1950-1976

Year	Total (1)		Protected Area				Unprotected Area	
			Federal Lands (2)		State and Private Lands (1)		State and Private Lands (3)	
	Number of Fires	Area Burned (1,000 Acres)	Number of Fires	Area Burned (1,000 Acres)	Number of Fires	Area Burned (1,000 Acres)	Number of Fires	Area Burned (1,000 Acres)
1950	208,402	15,519	8,418	391	96,578	3,408	103,404	11,720
1951	164,090	10,781	8,638	471	97,230	3,055	58,222	7,255
1952	188,277	14,187	9,634	281	118,363	6,347	60,280	7,559
1953	154,160	9,976	10,149	318	94,446	2,534	49,565	7,124
1954	176,891	8,833	8,592	176	118,681	2,787	49,614	5,830
1955	145,180	8,069	6,830	364	80,774	2,448	57,576	4,976
1956	143,485	6,606	11,341	372	82,997	1,613	49,147	4,621
1957	83,392	3,410	6,219	188	59,483	1,099	17,690	2,123
1958	97,910	3,280	12,942	288	67,366	1,173	17,602	1,819
1959	104,662	4,156	8,935	897	77,802	1,681	17,925	1,578
1960	103,387	4,478	12,090	622	77,537	1,909	13,760	1,947
1961	98,517	3,036	14,122	303	72,247	1,125	12,148	1,608
1962	115,345	4,079	10,421	270	94,487	1,646	10,437	2,163
1963	164,183	7,121	11,493	209	134,427	3,108	18,263	3,804
1964	116,358	4,197	8,877	194	90,480	1,670	17,001	2,333
1965	113,684	2,652	9,073	146	91,495	1,206	13,116	1,300
1966	122,500	4,574	11,571	1,265	98,157	1,908	12,772	1,401
1967	125,025	4,659	11,495	342	102,267	1,926	11,263	2,390
1968	125,371	4,232	10,027	1,205	107,689	1,633	7,655	1,394
1969	113,351	6,689	10,112	4,112	97,393	1,582	5,846	995
1970	121,736	3,279	14,968	719	101,455	1,541	5,313	1,019
1971	108,398	4,278	13,167	1,719	91,673	1,826	3,558	733
1972	124,554	2,641	15,937	1,232	83,010	1,050	25,607	359
1973	117,955	1,915	12,806	676	78,877	1,086	26,272	153
1974	145,868	2,879	15,040	1,200	105,835	1,511	24,993	168
1975	134,872	1,791	12,272	408	91,026	1,119	31,574	264
1976	241,699	5,110	15,800	519	157,035	2,119	68,864	2,472

(1) Includes Alaska and Hawaii beginning 1960.

(2) Includes Hawaii beginning 1952. Includes Alaska beginning 1960. Federal lands are National Forests, public domains, and lands administered by the U.S. Department of the Interior, Soil Conservation Service, Tennessee Valley Authority, etc.

(3) Includes Hawaii. Includes Alaska beginning 1960.

Sources: U.S. Bureau of the Census, Historical Statistics, Colonial Times to 1970, Series L48-L55, 1975, p. 537; and U.S. Department of Agriculture, Forest Service, Wildfire Statistics, annual issues.

7-14 Recreational Use of the National Forests, 1924-1964
(in thousands of visits)

Year (1)	Campgrounds	Winter Sports Sites	Other Special Use	Other Developed Sites	Wilderness System	Other Dispersed	Total
1924	1,588.5	-	1,200.3	1,871.5	-	-	4,660.3
1925	2,130.0	-	1,405.5	2,086.7	-	-	5,622.2
1926	2,056.7	-	1,584.1	2,403.4	-	-	6,044.2
1927	1,845.7	-	1,667.5	2,623.6	-	-	6,136.8
1928	1,845.7	-	1,767.1	2,937.5	-	-	6,550.3
1929	1,903.0	-	2,172.6	3,056.5	-	-	7,132.1
1930	1,980.7	-	1,657.5	3,272.7	-	-	6,910.9
1931	2,193.9	-	2,115.0	3,765.0	-	-	8,073.9
1932	2,178.2	-	1,668.8	4,048.8	-	-	7,895.8
1933	2,219.8	-	1,589.8	4,355.9	-	-	8,165.5
1934	2,343.1	-	1,627.5	4,610.2	-	-	8,580.8
1935	2,395.7	-	1,996.6	5,326.0	-	-	9,718.3
1936	2,421.3	-	2,548.1	5,811.7	-	-	10,781.1
1937	2,836.0	-	3,022.7	5,973.9	-	-	11,832.6
1938	3,181.8	-	3,685.5	7,627.9	-	-	14,495.2
1939	3,157.5	1,289.2	2,866.0	7,019.2	-	-	14,331.9
1940	3,583.1	1,538.4	3,109.9	7,931.5	-	-	16,162.9
1941	3,349.9	1,519.1	2,763.2	5,819.0	87.1	4,466.6	18,004.9
1942	1,771.3	993.9	1,676.0	3,300.6	55.6	2,609.8	10,407.2
1943	1,095.2	266.8	1,039.4	2,050.4	43.2	1,779.6	6,274.6
1944	1,246.8	287.4	1,262.5	2,051.1	50.0	2,254.2	7,152.0
1945	1,814.9	527.3	2,053.5	2,729.4	74.5	2,874.5	10,074.1
1946	3,055.1	1,249.2	3,384.8	4,458.7	144.4	5,948.4	18,240.6
1947	3,518.1	1,725.7	2,969.0	5,262.6	194.1	7,661.3	21,330.8
1948	3,424.1	2,284.9	2,826.4	6,682.2	213.4	8,579.8	24,010.8
1949	3,837.0	1,712.6	2,931.1	7,659.2	243.6	9,696.7	26,080.2
1950	3,858.8	1,504.6	2,983.2	7,577.6	245.8	11,197.8	27,367.8
1951	4,140.9	1,929.3	3,248.2	8,669.3	312.4	11,650.1	29,950.2
1952	4,528.0	1,758.1	3,731.9	9,515.9	386.7	13,086.3	33,006.9
1953	4,310.3	1,944.2	3,910.2	10,335.9	408.3	13,994.1	35,403.0
1954	5,806.1	2,362.4	4,490.8	11,467.8	395.8	15,781.0	40,303.9
1955	6,796.7	2,977.2	4,749.6	12,418.3	462.1	18,308.9	45,712.8
1956	7,205.0	3,040.5	5,688.4	14,667.2	448.3	21,506.7	52,556.0
1957	8,352.4	3,158.7	5,709.5	16,138.5	534.6	27,063.8	60,957.5
1958	9,324.7	4,127.0	5,692.4	17,845.2	556.1	30,904.1	68,449.5
1959	9,955.8	4,184.1	6,223.8	19,283.3	564.7	41,309.3	81,521.0
1960	10,878.0	4,706.8	6,440.7	19,800.8	614.3	50,153.9	92,594.5
1961	11,835.1	4,478.3	7,235.3	20,456.8	756.7	57,150.3	101,912.5
1962	12,940.9	5,575.8	8,136.3	21,283.6	815.2	64,010.4	112,762.2
1963	13,562.5	6,677.6	7,306.8	21,575.4	937.1	72,522.6	122,582.0
1964	14,152.1	7,911.8	8,185.3	21,476.9	973.8	81,062.4	133,762.3

(1) Calendar year.

Source: U.S. Department of Agriculture, Forest Service, Recreation Information Management System, unpublished data.

7-15 Recreational Use of the National Forests, 1965-1977
(in thousands of visitor-days) (1)

Year (2)	Campgrounds	Winter Sports Sites	Other Special Use	Other Developed Sites	Wilderness System	Other Dispersed	Total
1965	34,040.0	5,481.6	19,914.0	9,443.0	4,522.1	84,350.9	160,336.1
1966	32,664.1	4,842.6	18,186.1	8,182.2	4,790.7	82,063.2	150,728.9
1967	30,230.7	5,102.3	17,662.3	7,879.5	4,690.1	84,082.2	149,647.1
1968	30,665.1	5,564.0	18,500.3	7,742.5	5,056.2	89,137.2	156,665.3
1969	31,669.6	5,661.8	18,186.7	8,222.2	5,071.9	94,025.9	162,838.1
1970	34,562.3	6,478.8	17,716.9	8,897.2	5,842.8	99,056.5	172,554.5
1971	35,731.7	6,961.7	17,572.5	9,396.3	8,103.6	100,343.7	178,109.5
1972	36,079.5	6,520.6	17,442.8	9,590.2	6,459.4	107,865.8	183,958.3
1973	35,965.2	8,290.0	16,681.0	9,764.1	6,681.7	110,792.6	188,174.6
1974	35,677.9	7,722.0	17,103.4	9,455.0	6,743.2	116,214.3	192,915.8
1975	37,721.2	8,921.3	17,640.9	10,781.5	7,802.0	116,333.9	199,200.8
1976	37,134.9	7,143.7	17,395.4	11,458.9	7,105.6	119,689.6	199,928.1
1977	37,545.9	6,970.3	29,249.3*	*	8,008.3	123,023.6	204,797.4

(1) A visitor-day equals recreational use of National Forest land and water that aggregates to 12 person-hours. It may entail 1 person for 12 hours, 12 persons for 1 hour, or any equivalent combination of individual or group use, either continuous or intermittent.

(2) Calendar year.

* Visitor-days for Other Developed Sites are included in Other Special Use.

Source: U.S. Department of Agriculture, Forest Service, Recreation Information Management System, unpublished data.

7-16 Recreational Use of the National Forests, by Activity, 1976

Activity	Visitor Days (1) (thousands)	Percent of Use
Camping, incl. Org. Camp Use	56,871.2	28.4
Camping	52,742.5	26.4
Organizational Camp Use	4,128.7	2.1
Recreational Travel (Mechanized)	47,307.8	23.7
Automobile	39,366.9	19.7
Scooter and Motorcycle	4,104.4	2.1
Ice and Snowcraft	3,340.9	1.7
Other	495.6	.2
Fishing	16,097.8	8.1
Hunting	14,059.4	7.0
Resort and Residence Use	11,022.1	5.5
Resort Use	4,262.1	2.1
Recreation Residence Use	6,760.0	3.4
Boating and Water Sports	10,740.3	5.4
Boating	5,969.7	3.0
Power Boats	3,553.1	1.8
Self-Propelled Boats	2,416.6	1.2
Waterskiing and Other Water Sports	864.8	.4
Swimming and Scuba Diving	3,905.8	2.0
Hiking and Mountain Climbing	9,178.0	4.6
Nature Study, incl. Viewing Scenery, etc.	9,040.9	4.5
Nature Study	1,213.5	.6
Viewing Scenery, Sports, Entertainment	7,827.4	3.9
Picnicking, incl. Games and Team Sports	8,522.0	4.3
Picnicking	7,754.1	3.9
Games and Team Sports	767.9	.4
Winter Sports	8,007.4	4.0
Skiing	6,528.5	3.3
Other	1,478.9	.7
Visitor Information (Exhibits, Talks, etc.)	3,927.6	2.0
Horseback Riding	2,690.0	1.3
Gathering Forest Products	2,463.6	1.2
Total, All Activities	199,928.1	100.0

(1) A visitor-day equals recreational use of National Forest land and water that aggregates to 12 person-hours. It may entail 1 person for 12 hours, 12 persons for 1 hour, or any equivalent combination of individual or group use, either continuous or intermittent.

Source: U.S. Department of Agriculture, Forest Service, Recreation Information Management System, unpublished data.

7-17 Grazing Lands (1), by Ecogroup and Ecosystem, 1970 and 1977
(in thousands of acres)

Ecogroup and Ecosystem	1970	1977 (2)
Western Range	343,867	330,900
Sagebrush	94,219	129,800
Desert Shrub	86,043	79,500
Southwestern Shrubsteppe	38,601	43,200
Mountain Grasslands	79,839	27,200
Mountain Meadows	4,045	3,300
Desert Grasslands	26,098	24,700
Annual Grasslands	6,700	10,200
Alpine (3)	8,322	6,800
Desert	N.A.	6,200
Western Forests	235,387	352,500
Douglas Fir	38,935	40,400
Ponderosa Pine	37,568	39,200
Western White Pine	4,053	600
Fir-Spruce	24,384	118,600
Hemlock-Sitka Spruce	7,076	20,800
Larch	5,144	3,000
Lodgepole Pine	19,143	23,600
Redwood	928	800
Hardwoods	23,398	44,100
Chaparral-Mountain Shrub	32,081	14,100
Pinyon-Juniper	42,677	47,300
Great Plains	228,859	208,300
Shinnery	2,004	4,700
Texas Savanna	15,221	28,400
Plain Grasslands	173,260	175,200
Prairie (4)	38,374	41,100
Eastern Forests	393,483	392,000
White-Red-Jack Pine	12,556	13,000
Spruce-Fir	23,595	22,300
Longleaf-Slash Pine	20,889	18,800
Loblolly-Shortleaf Pine	55,095	54,200
Oak-Pine	34,464	37,400
Oak-Hickory	125,081	124,600
Oak-Gum-Cypress	34,074	31,800
Elm-Ash-Cottonwood	25,038	27,300
Maple-Beech-Birch	35,633	36,600
Aspen-Birch	22,564	21,600
Wet Grasslands	4,494	4,400
Total, All Ecogroups	1,201,596	1,283,700

7-17 Grazing Lands (1), by Ecogroup and Ecosystem, 1970 and 1977 (cont.)

N.A. - Not Available.

Data may not add to totals due to rounding.

(1) Native or natural grassland or forest land capable of sustaining livestock. Includes the 48 conterminous states.

(2) Preliminary data.

(3) Includes barren areas above tree line.

(4) Contains portions of prairie that extend out of the Great Plains.

Sources:
1970: U.S. Department of Agriculture, Forest Service, The Nation's Range Resources, Forest Resource Report No. 19, 1972, pp. 115, 119 and 121.
1977: U.S. Department of Agriculture, Forest Service, unpublished data.

7-18 Ownership of Grazing Lands, 1970

Ownership	Millions of acres	Percent
Total Grazing Land and Improved Private Pastureland	1,302.7	100.0
Grazing Land (1)	1,201.6	92.2
Federal	372.7	28.6
Forest Service	165.9	12.7
Other Federal (2)	206.8	15.9
Nonfederal (3)	828.9	63.6
Improved Private Pastureland (4)	101.1	7.8

(1) Native or natural grassland or forest land capable of sustaining livestock. Includes the 48 conterminous states.

(2) Primarily Bureau of Land Management. Also includes Bureau of Indian Affairs, National Park Service, Fish and Wildlife Service, etc.

(3) Includes state and other public (county, municipal) and private.

(4) Refers to lands managed in such a way as to maximize the production of forage for livestock production.

Source: U.S. Department of Agriculture, Forest Service, The Nation's Range Resources, Forest Resource Report No. 19, 1972, pp. 19 and 21.

7-19 Productivity of Grazing Lands (1), 1970

Ecogroup	Area		Productivity	
	Millions of Acres	Percent	Thousands of AUM's (2)	Percent
Total, All Ecogroups	1,201.6	100	213,102	100
Western Range	418.6	35	56,081	26
Western Forest	160.6	13	10,729	5
Great Plains	228.9	19	92,767	44
Eastern Forest	393.5	33	53,525	25

(1) Includes all ownerships - National Forest Service, other federal land, and nonfederal land.

(2) Animal unit month (AUM) is the amount of forage required to sustain a mature cow or its equivalent for one month.

Source: U.S. Department of Agriculture, Forest Service, The Nation's Range Resources, Forest Resource Report No. 19, 1972, pp. 21 and 132.

3

WILDLIFE

8-1 Populations of Selected Big Game Animals on National Forests and National Grasslands, 1960-1977

Year	Mule Deer	Whitetail Deer	Blacktail Deer	Elk	Turkey	Black Bear	Antelope	Mountain Goat	Moose	Javelina
1960	2,160,000	902,000	559,000	299,000	99,000	109,000	54,000	26,000	16,000	N.A.
1961	2,322,000	898,000	620,000	313,000	120,000	109,000	54,000	30,000	17,000	N.A.
1962	2,413,000	935,000	670,000	334,000	116,000	109,000	49,000	29,000	20,000	N.A.
1963	2,380,000	865,000	688,000	338,000	131,000	106,000	51,000	31,000	21,000	N.A.
1964	2,351,000	900,000	714,000	346,000	152,000	105,000	48,000	31,000	21,000	N.A.
1965	2,367,000	936,000	720,000	361,000	164,000	108,000	50,000	32,000	21,000	N.A.
1966	2,204,000	879,000	720,000	357,000	160,000	110,000	46,000	31,000	21,000	N.A.
1967	2,251,000	928,000	817,000	375,000	162,000	108,000	44,000	30,000	21,000	N.A.
1968	2,144,000	930,000	765,000	351,000	155,000	103,000	38,000	31,000	22,000	N.A.
1969	2,138,000	887,000	666,000	361,000	155,000	100,000	38,000	31,000	21,000	N.A.
1970	2,089,000	861,000	659,000	362,000	159,000	98,000	37,000	31,000	24,000	N.A.
1971	2,013,000	809,000	645,000	366,000	165,000	97,000	39,000	30,000	23,000	N.A.
1972	1,852,000	810,000	630,000	368,000	175,000	97,000	42,000	29,000	25,000	N.A.
1973	1,767,000	782,000	516,000	365,000	171,000	92,000	39,000	29,000	25,000	20,000
1974	1,662,000	824,000	506,000	387,000	175,000	93,000	42,000	27,000	25,000	21,000
1975	1,491,000	814,000	504,000	396,000	165,000	94,000	46,000	27,000	22,000	21,000
1976	1,396,000	783,000	519,000	401,000	169,000	96,000	45,000	24,000	23,000	20,000
1977	1,405,000	807,000	511,000	431,000	176,000	93,000	50,000	24,000	23,000	21,000

8-1 Populations of Selected Big Game Animals on National Forests and National Grasslands, 1960-1977 (cont.)

Year	Bighorn Sheep	Mountain Lion	Alligator	Alaska Brown Bear	Wild Boar	Dall Sheep	Wolf	Grizzly Bear	Caribou	Barbary Sheep	Bison
1960	11,000	N.A.	N.A.	6,230	1,365	1,000	N.A.	745	N.A.	N.A.	N.A.
1961	11,100	N.A.	N.A.	6,235	2,505	900	N.A.	775	N.A.	N.A.	N.A.
1962	11,100	N.A.	N.A.	6,235	2,020	900	N.A.	805	N.A.	N.A.	N.A.
1963	11,100	N.A.	N.A.	6,335	2,010	900	N.A.	820	N.A.	N.A.	N.A.
1964	12,100	N.A.	N.A.	6,335	2,130	900	N.A.	780	N.A.	N.A.	N.A.
1965	13,000	N.A.	N.A.	6,200	2,300	900	N.A.	900	N.A.	N.A.	N.A.
1966	13,000	N.A.	N.A.	6,300	2,400	900	2,500	900	150	N.A.	N.A.
1967	14,000	N.A.	N.A.	6,330	2,600	900	2,800	903	150	N.A.	N.A.
1968	13,000	N.A.	N.A.	6,419	2,700	900	2,700	829	175	N.A.	N.A.
1969	12,800	N.A.	N.A.	6,350	2,500	1,210	2,500	832	160	N.A.	N.A.
1970	12,800	N.A.	N.A.	8,350	1,900	1,205	2,700	830	125	N.A.	N.A.
1971	12,850	N.A.	N.A.	5,960	2,600	1,150	2,600	700	260	N.A.	N.A.
1972	12,850	N.A.	N.A.	5,960	3,300	1,150	2,000	800	280	N.A.	N.A.
1973	13,000	7,300	6,900	5,400	3,000	1,200	1,600	810	350	160	350
1974	13,000	8,400	6,500	5,400	3,200	1,200	1,400	670	360	270	310
1975	14,000	8,300	6,400	5,300	2,600	1,200	1,300	620	400	280	300
1976	15,000	8,400	7,200	5,300	2,800	1,200	1,400	620	400	310	230
1977	16,000	8,700	7,800	5,300	3,000	1,200	1,000	630	390	200	150

N.A. - Not Available.

Sources: U. S. Department of Agriculture, Forest Service, Division of Wildlife Management, Annual Wildlife Report, 1977, and previous annual issues.

8-2 Populations of Selected Big Game Animals in the Western States (1), 1975

State	Bison	Pronghorn Antelope	Bighorn Sheep	Mule and Blacktail Deer	Elk	Total
Arizona	320	7,000	2,000	130,000	10,000	149,320
California	-	4,869	3,750	650,000	3,392	662,011
Colorado	-	32,000	2,500	325,000	120,000	479,500
Idaho	25	13,250	2,975	178,000	50,600	244,850
Montana	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Nevada	-	5,000	4,000	81,700	200	90,900
New Mexico	-	26,900	800	261,600	27,500	316,800
Oregon	-	11,000	400	1,050,000	107,000	1,168,400
Utah	150	2,500	450	275,000	13,000	291,100
Washington	-	50	435	373,500	60,000	433,985
Wyoming	-	168,000	3,100	280,000	63,000	514,100
Totals	495	270,569	20,410	3,604,800	454,692	4,350,966
% of Pre-Columbian Nos.	<1	2-3	<1?	>100?	25	15-20

N.A. - Not Available.

(1) Estimates provided by officials of the fish and game departments in each state.

Source: Frederic H. Wagner, "Livestock Grazing and the Livestock Industry," in Wildlife and America, Council on Environmental Quality, edited by Howard P. Brokaw, 1979, Table 1, p. 140, forthcoming.

8-3 Continental Waterfowl Population Levels
(in millions)

Species	Population Component Measured	Recent Population Range (1)	1978 Population Level	Population Trend (1,2)
Ducks				
Mallard	Breeding	5.9-12.9	7.6	V-D
Gadwall	Breeding	0.7-2.1	2.0	S
Wigeon	Breeding	2.2-3.8	3.8	S
Green-winged Teal	Breeding	1.1-3.2	3.0	S
Blue-winged Teal	Breeding	3.7-6.4	4.5	S
Shoveler	Breeding	1.4-2.5	2.2	S
Pintail	Breeding	4.1-10.5	5.7	V-D
Redhead	Breeding	0.4-1.0	0.8	V-S
Canvasback	Breeding	0.4-0.7	0.4	V-S
Scaup	Breeding	5.4-9.5	7.1	I
Canada Geese:				
Atlantic Flyway	Post-Season	0.68-0.92	0.80	I
Mississippi Flyway	Post-Season	0.50-1.07	1.09	I
Central Flyway	Post-Season	0.16-0.59	0.58	V-I
Pacific Flyway	Post-Season	0.20-0.49	0.43	V-I
Snow Geese:				
Atlantic Flyway	Post-Season	0.03-0.13	0.10	I
Mississippi Flyway	Post-Season	0.28-0.94	0.80	S
Central Flyway	Post-Season	0.36-1.21	1.20	I
Pacific Flyway	Post-Season	0.24-0.51	0.24	S
Ross' Geese	Post-Season	0.02-0.04	0.03	S
White-fronted Geese:				
Central Flyway	Spring	0.08-0.34	0.34	I
Pacific Flyway	Post-Season	0.05-0.20	0.11	V-D
Brant				
Atlantic Flyway	Post-Season	0.04-0.15	0.05	D
Pacific Flyway	Post Season	0.12-0.16	0.16	V-D
Whistling Swan:				
Atlantic Flyway	Post Season	0.06-0.08	0.07	I
Pacific Flyway	Post-Season	0.03-0.08	0.05	S

(1) Generally for period 1955-77, except 1969-1978 for geese. Breeding population estimates based on May breeding ground surveys. Most estimates include adjustment for unseen birds and, therefore, represent actual numbers of bids.

(2) I, Increase; D, Decrease; S, Stable; V, Variable/fluctuating.

Source: U.S. Department of the Interior, Fish and Wildlife Service, Office of Migratory Bird Management, unpublished data.

8-4 Cumulative Extinction of Some Wildlife, 1760-1977

Years	Birds, Mammals, and Fish		
	Cumulative Total Lost, Species and Subspecies	Number Lost	
		Species	Subspecies
1760-1779	1	1	
1780-1799			
1800-1819			
1820-1839	4	1	2
1840-1859	6	2	
1860-1879	8	1	1
1880-1899	22	8	6
1900-1919	31	6	3
1920-1939	41	3	8
1940-1959	46	3	1
1960-1977			
Total, 1760-1977	46	25	21

Years	Birds			Mammals			Fish		
	Cumulative Total, Species and Subspecies	Number Lost		Cumulative Total, Species and Subspecies	Number Lost		Cumulative Total, Species and Subspecies	Number Lost	
		Species	Subspecies		Species	Subspecies		Species	Subspecies
1760-1779				1	1				
1780-1799									
1800-1819									
1820-1839	3	1	2						
1840-1859	5	2							
1860-1879	7	1	1						
1880-1899	18	6	5	4	2	1			
1900-1919	23	4	1	7	1	2	1	1	
1920-1939	31	1	7	8		1	3	2	
1940-1959	32	1					6	2	1
1960-1977									
Total, 1760-1977	32	16	16	8	4	4	6	5	1

Includes Hawaii, where most losses occurred.
Four species/subspecies have two different extinction dates. The later date has been used.

Source: U.S. Department of the Interior, Fish and Wildlife Service, Threatened Wildlife of the United States, 1973, pp. 1-4.

8-5 Threatened and Endangered Species in the United States, 1978

Category	Number of Endangered Species (1)			Number of Threatened Species (2)		
	U.S. (3)	Foreign(4)	Total	U.S. (3)	Foreign(4)	Total
Mammals	33	227	260	3	18	21
Birds	67	144	211	3		3
Reptiles	11	47	58	10		10
Amphibians	5	9	14	2		2
Fishes	29	10	39	12		12
Snails	2	1	3	5		5
Clams	23	2	25			
Crustaceans	1		1			
Insects	6		6	2		2
Plants	20		20	2		2
Total	197	440	637	39	18	57

Data as of November 30, 1978.

(1) An endangered species is one that is in danger of becoming extinct throughout all or a significant part of its natural range.

(2) A threatened species is one that is likely to become endangered in the forseeable future.

(3) Includes 50 states and all U.S. territories.

(4) Foreign species are those living outside the U.S. and its territories. Their number, as determined by the U.S. Department of the Interior, Fish and Wildlife Service, includes those listed by the International Trade Convention in Endangered Species, the International Union for Conservation of Nature and Natural Resources, and those species that are generally accepted in the biological community as being endangered or threatened.

Source: U.S. Department of the Interior, Fish and Wildlife Service, Endangered Species Technical Bulletin, November 1978, Volume III, No. 11, p. 12.

8-6 Population of Selected Endangered, Threatened, and Other Important Species, 1900-1977

Species	Population	Year
California Brown Pelican (1)	100,000	1972
American Alligator (2)	52,165	1970
Eastern Brown Pelican (3)	17,000	1972
Red Cockaded Woodpecker	3,000 - 10,000	1972
Utah Prairie Dog	5,715	1972
Southern Bald Eagle (4)	2,000 - 4,000	1971
Arctic Peregrine Falcon (5)	3,000	1972
San Joaquin Kit Fox	1,000 - 3,000	1972
Attwater's Greater Prairie Chicken	2,200	1971
Eastern Timber Wolf (6)	832 - 1,332	1970
Grizzly Bear	695 - 1,020	1970
Key Deer	30 300 600	1949 1964 1972
Delmarva Peninsula (Bryant) Fox Squirrel	468	1972
Red Wolf (7)	16	1968
Whooping Crane (8)	1,000 - 2,000 14 80 126	Presettlement 1939 1972 1976

8-6 Population of Selected Endangered, Threatened, and Other Important Species, 1900-1977 (cont.)

Species	Population	Year
American Peregine Falcon (9)	59 - 61	1970
California Condor	800	Pre-1900
	100	1948
	65	1965
	55	1970
	45	1977
Black Footed Ferret (10)	31 - 32	1972

(1) Includes those in California and Mexico.

(2) Excludes several thousand in captivity.

(3) Estimated 8,500 breeding pairs.

(4) Includes the 48 conterminous states.

(5) Estimated from a few thousand breeding pairs.

(6) Excludes 22 in captivity.

(7) Includes only those in captivity.

(8) Estimates include those wild and in captivity.

(9) Includes those in captivity but excludes a few thousand pairs in the interior of Alaska.

(10) Excludes 3 in captivity.

Sources: U.S. Department of the Interior, Advisory Committee on Predator Control, Predator Control 1971, prepared for the Council on Environmental Quality and U.S. Department of the Interior, January 1972, pp. 83 and 86; U.S. Department of the Interior, Fish and Wildlife Service, Threatened Wildlife of the United States, published 1973; and U.S. Department of the Interior, Fish and Wildlife Service, unpublished data.

8-7 Federal Protected Wildlife Habitat, 1900-1978
(in thousands of acres, unless otherwise noted)

Year	Total Federal Wildlife Habitat (1)		National Wildlife Refuge System (2)		Natural Areas in National Parks (3)		National Wilderness Perservation System (4)	
	Number of Areas	Acres	Number of Areas	Acres	Number of Areas	Acres	Number of Areas	Acres
1900	5	4,063	0	0	5	4,063	0	0
1910	52	8,190	31	434	21	7,756	0	0
1920	107	16,671	76	3,396	31	13,275	0	0
1930	136	22,853	86	4,823	47	17,670	3	360
1940	310	52,157	262	13,635	60	23,819	73	14,217
1950	402	54,914	265	17,180	60	23,819	77	13,915
1960	410	69,265	277	17,318	61	23,834	83	14,661
1970	488	64,569	332	29,242	69	24,932	87	10,395
1975	580	70,831	378	32,272	74	25,834 (a,b)	128	12,716
1976	620	72,755	384	32,443	75	25,858 (a,b)	161	14,454
1977	628	72,869	386	32,547	75	25,837 (a,b)	167	14,485
1978	N.A.	N.A.	390	32,600 (c)	N.A.	N.A.	187	19,001 (d)

All data are cumulative totals.

N.A. - Not Available.

(1) There may be a slight overlap in areas protected by the National Wildlife Refuge System, Natural Areas in National Parks, and the National Forest Wilderness System. This total excludes areas administered by other federal agencies as natural areas or wilderness areas, such as those administered by the Bureau of Land Management (U.S. Department of the Interior), U.S. Department of Defense, U.S. Department of Energy, and the Tennessee Valley Authority.

(2) Excludes Waterfowl Production Areas and Coordination Areas.

(3) Includes National Parks, National Monuments, and National Preserves in the National Park System.

(4) Data from 1930-1960 and 1970-1978 are not strictly comparable. 1930-1960 data include lands in the National Forest Wilderness System only, which include the Forest Service's Primitive, Canoe, Wilderness, and Wild Areas. 1970-1978 data include lands in the National Wilderness Preservation System, established in 1964 and managed by the Forest Service (National Forest Wilderness), the Fish and Wildlife Service (National Wildlife Refuge Wilderness), the National Park Service (National Park Wilderness), and the Bureau of Land Management. (BLM lands were not admitted to the system until late 1978 and are excluded here.)

(a) The fluctuation in acreage in National Areas in National Parks between 1975 and 1977 is due to a change in measurement, not a change in designation.
(b) Includes 8,100 acres designated Wilderness in Mesa Verde National Park, Colorado. Excludes the remainder of Mesa Verde National Park, which is an historical area.
(c) As of September 30, 1978.
(d) As of November 13, 1978. Excludes approximately 12,000 acres managed by the Bureau of Land Management.

8-7 Federal Protected Wildlife Habitat 1900-1978 (cont.)

Sources:

National Wildlife Refuge System: U.S. Department of the Interior, Fish and Wildlife Service, Annual Report of Land Under Control of the U.S. Fish and Wildlife Service as of September 30, 1977, Table 1, and previous annual issues; and U.S. Department of the Interior, Fish and Wildlife Service, unpublished data.

Natural Areas in National Parks:

1900-1976: U.S. Department of the Interior, National Park Service, Index of the National Park System and Affiliated Areas as of January 1, 1975, published 1975; and U.S. Department of the Interior, National Park Service, "Updated Agenda of October 22, 1976 for the Index of the National Park System and Affiliated Areas as of January 1, 1975."

1977: U.S. Department of the Interior, National Park Service, Index of the National Park System and Affiliated Areas as of June 30, 1977, pp. 9 and 32.

National Wilderness Preservation System:

1930-1960 (Areas and Acres): U.S. Department of Agriculture, Forest Service, "Notes and Statistics on the National Forest Wilderness System," January 1, 1964, Table III.

1970 (Acres), 1975 (Acres), and 1976 (Areas and Acres): U.S. Department of Agriculture, Forest Service, Wilderness Monitoring System, computer printout, August 1, 1977.

1970 (Areas), 1975 (Areas), and 1977 (Areas and Acres): U.S. Department of Agriculture, Forest Service, unpublished data; U.S. Department of the Interior, National Park Service, unpublished data; and U.S. Department of the Interior, Fish and Wildlife Service, unpublished data.

1978 (Areas and Acres): U.S. Department of Agriculture, Forest Service, Recreation Management Staff, "Wilderness Fact Sheet", November 13, 1978.

8-8 State Protected Wildlife Habitat (1), 1975
(in thousands of acres, unless otherwise noted)

State	Areas Managed Specifically For Wildlife		Others, Such As Forests & Parks		Natural Areas		Total, State Acres In Wildlife Habitat
	Number of Areas	Acres	Number of Areas	Acres	Number of Areas	Acres	
Alabama	37	412	29	59	1	2	473
Alaska	11	908	5	1,418	9	489	2,815
Arizona	30	19	9	24	4	9	52
Arkansas	24	234	22	35	2	1	270
California	31	130	-	-	8	1	131
Colorado	208	240	20	96	-	-	336
Connecticut	N.A.	20		180	5	1	201
Delaware	48	22	4	6	-	-	28
Florida	3	169	124	1,487		207	1,864
Georgia	5	28	3	52	-	-	80
Hawaii	25	484	37	309	4	12	806
Idaho	33	77	28	442	-	-	519
Illinois	36	62	107	109	36	11	182
Indiana	16	80	37	205	36	6	292
Iowa	256	208	953	129	30	2	340
Kansas	67	63	18	24	2	<0.5	87
Kentucky	21	41	41	77	1	3	121
Louisiana	19	292		18	1	5	315
Maine	29	32	78	310	-	-	342
Maryland	35	104	48	158	1	<0.5	262
Massachusetts	79	53	143	328	439	30	411
Michigan	97	222	128	3,830	-	-	4,102
Minnesota	1,361	1,106	115	4,567	5	2	5,674
Mississippi	3	22	14	14	-	-	35
Missouri	N.A.	298	N.A.	20	N.A.	4	321
Montana	30	120	15	5	-	-	125
Nebraska	107	49	-	-	-	-	49
Nevada	14	43	-	-	-	-	43
New Hampshire	70	14	172	96	-	-	110
New Jersey	64	138	24	200	13	4	343

8-8 State Protected Wildlife Habitat, 1975 (cont.)

State	Areas Managed Specifically For Wildlife		Others, Such As Forests & Parks		Natural Areas		Total, State Acres In Wildlife Habitat
	Number of Areas	Acres	Number of Areas	Acres	Number of Areas	Acres	
New Mexico	58	159	-	-	-	-	159
New York	114	118	157	3,277	26	37	3,432
North Carolina	10	185	28	105	2	1	291
North Dakota	124	64	15	10	3	3	77
Ohio	68	120	80	420	26	6	546
Oklahoma	40	129	194	957	-	-	1,086
Oregon	17	105		1,659	-	-	1,764
Pennsylvania	403	1,195	42	2,000	3	<0.5	3,195
Rhode Island	14	30	2	1	-	-	31
South Carolina	6	41	(a)	1,198	-	-	1,239
South Dakota	508	127	1	72	-	-	199
Tennessee	48	1,239	49	215	32	49	1,502
Texas	10	162	65	95	-	-	257
Utah	25	258	Many	164	-	-	422
Vermont	55	76	68	145	13	18	240
Virginia	22	165	23	85	-	-	250
Washington	360	784 (b)	73	115	6	<0.5	899
West Virginia	47	77	38	140	3	1	218
Wisconsin	506	472	35	2,700	129	18	3,190
Wyoming	41	126	-	-	-	-	126
Total	>5,236	11,321	>3,044	27,761	>840	925	39,851

N.A. - Not Available.

(1) State owned lands.

(a) Includes coastal and inland marshes, lakes, and streams, which under South Carolina law are state owned.

(b) Includes 364,000 actually owned and 420,000 controlled.

Source: Gustav A. Swanson, "Wildlife on the Public Lands," in Wildlife and America, Council on Environmental Quality, edited by Howard P. Brokaw, Table 4, p. 437, forthcoming.

8-9 Animals Removed or Killed by Predator Control Activities, 1937-1977

Year (1)	Bear	Bobcat	Coyotes	Red Wolves (2)	Lobo Wolves	Mountain Lion
1937	299	7,472	80,299	980	27	212
1938	392	7,189	84,844	1,343	17	255
1939	495	9,033	93,039	1,188	26	241
1940	608	10,566	104,072	1,246	9	214
1941	528	10,347	110,495	1,362	5	204
1942	636	10,957	111,076	781	10	204
1943	618	9,527	103,971	1,004	10	147
1944	592	8,900	108,050	1,161	9	167
1945	619	7,325	102,979	1,354	11	163
1946	730	6,487	108,311	1,551	6	113
1947	919	6,508	103,982	1,450	10	127
1948	744	7,223	90,270	1,053	14	148
1949	652	8,231	75,448	1,032	4	131
1950	719	10,874	66,281	1,051	108	236
1951	733	13,343	60,455	1,244	134	229
1952	714	13,476	50,661	1,451	182	197
1953	729	18,905	55,000	1,797	65	184
1954	860	19,559	52,636	1,589	93	232
1955	874	19,249	55,204	2,487	171	195
1956	977	19,495	55,402	1,940	96	285
1957	1,039	22,198	62,585	2,681	109	267
1958	1,023	23,453	62,765	2,615	172	331
1959	978	25,079	78,714	3,393	161	292

8-9 Animals Removed or Killed by Predator Control Activities, 1937-1977 (cont.)

Year (1)	Bear	Bobcat	Coyotes	Red Wolves (2)	Lobo Wolves	Mountain Lion
1960	1,023	25,808	94,769	3,830	2	290
1961	1,039	25,177	100,363	2,532	1	276
1962	815	21,228	104,787	2,780	2	254
1963	842	20,780	89,653	2,771	8	294
1964	711	20,918	97,096	2,617	24	323
1965	605	17,294	90,236	-	15	280
1966	549	13,365	77,258	-	5	212
1967	499	11,031	75,892	-	9	143
1968	440	9,351	69,390	-	34	152
1969	399	8,443	74,070	-	14	145
1970	403	8,403	73,093	-	11 (a)	121
1971	234	6,608	75,661	-	14 (a)	80
1972	191	5,351	71,298	-	-	49
1973	196	4,526	76,490	-	-	29
1974	86	3,790	71,777	-	-	24
1975	117	2,559	81,471	-	-	39
1976 (3)	179	2,298	88,985	-	-	51
1977	99	1,052	68,598	-	-	58

Known number of animals removed or killed through the predator control program of the Bureau of Sport Fisheries and Wildlife and its predecessors.

(1) Fiscal Year.

(2) Figures for 1937-1964 include the species "colloquially" called wolves which are actually coyotes, coyote-dog hybrids, coyote-red wolf hybrids, or dog-red wolf hybrids.

(3) Includes a 15-month (five quarter) year from July 1, 1975 to September 30, 1976.

(a) Taken in Alaska for protection of reindeer.

Sources:
1960-1970: Advisory Committee on Predator Control, Predator Control 1971, prepared for the Council on Environmental Quality and U.S. Department of the Interior, January 1972, p. 22.
1971-1977: U.S. Department of the Interior, Fish and Wildlife Service, Animal Damage Control Division, unpublished data.

8-10 Toxic Residues in U.S. Fish, 1969-1977
(in parts per million-geometric mean)

Year	DDT (1)	Toxaphene	Dieldrin (2)	PCB's
1969	1.06	N.A.	.08	1.06
1970	.87	N.A.	.08	1.07
1971	.67	<.05	.04	.90
1972	.59	.11	.07	1.07
1973	.40	.11	.04	.71
1974	.44	.11	.08	.96
1975	(a)	(a)	(a)	(a)
1976/77	.36	.35	.06	.87

Freshwater fish samples collected by Fish and Wildlife Service personnel in all 50 states as part of the National Pesticide Monitoring Program. Two-thirds of the fish sampled are bottom-dwelling species such as carp, suckers, or catfish. The remaining one-third of the fish sampled are predacious species, such as trout, walleye, bass, and bluegill. The whole fish is analyzed, not just the fillet.

(1) Includes DDT and its derivatives.

(2) Includes Aldrin.

(a) Not measured in 1975.

Source: U.S. Department of the Interior, Fish and Wildlife Service, Columbia National Fisheries Research Laboratory, Columbia, Missouri, unpublished data.

8-11 Toxic Residues in Great Lakes Fish, 1969-1976
(in parts per million)

Year	DDT			Dieldrin			PCB's			Mercury			
	Lake Trout	Coho Salmon	Bloaters	Lake Trout	Coho Salmon	Bloaters	Lake Trout	Coho Salmon	Bloaters	Walleye (1)	Rock Bass(1)	Channel Catfish	Yellow Perch(1)
1969	(a)	11.82	9.94	(a)	0.21	0.27	(a)	(a)	(a)	(a)	(a)	(a)	(a)
1970	19.19	14.03	9.87	0.27	0.12	0.19	(a)	(a)	(a)	2.83	(a)	(a)	(a)
1971	13.00	9.85	6.24	0.20	0.11	0.27	(a)	(a)	(a)	(a)	(a)	(a)	(a)
1972	11.31	7.17	4.33	0.20	0.13	0.18	12.86	10.93	5.66	1.38	(a)	(a)	(a)
1973	9.96	4.48	2.09	0.27	0.09	0.28	18.93	12.17	5.24	1.18	1.24	1.62(1)	(a)
1974	8.42	3.82	1.33	0.30	0.10	0.28	22.91	10.45	5.57	1.07	0.49	0.37	1.22
1975	7.50	3.25	1.27	0.35	0.10	0.39	22.28	10.77	4.54	1.03	0.37	0.35	0.31
1976	5.65	2.98	0.90(b)	0.30	0.08	0.35	18.68	9.21	4.11	0.78	0.37	0.35	0.28

Concentrations of DDT, Dieldrin and PCB's are from fall collections of Lake Michigan bloaters and lake trout off Saugatuck, Michigan, and coho salmon from east-central Lake Michigan. Mercury concentrations are from fall collections of selected Lake St. Clair fish. Concentrations are in whole fish (except where noted) and are wet weight.

Food and Drug Administration maxium allowable levels of toxic substances in fish are: DDT-5.0 ppm; PCB's-5.0 ppm; Dieldrin-0.3 ppm; and Mercury-0.5 ppm. (The level for PCB's is under review for a change to 2.0 ppm.) However, these FDA guidelines are not strictly comparable to data here since the guidelines pertain only to edible portions of the fish, and the Fish and Wildlife Service monitoring program generally analyzes the whole body of the fish. Concentrations of toxics in edible portions of fish are slightly lower than those in whole fish.

(1) Concentrations in fillets, not whole fish.

(a) Not measured.

(b) Also includes DDE, a derivative of DDT.

Source: U.S. Department of the Interior, Fish and Wildlife Service, Great Lakes Fishery Laboratory, Ann Arbor, Michigan, unpublished data.

8-12 Toxic Residues in U.S. Waterfowl by Flyway, 1965-1976
(in parts per million)

Year	DDE (1)			
	Pacific	Central	Mississippi	Atlantic
1965/66	0.65(a)	0.15(a)	0.25(a)	0.70(a)
1969	0.71	0.30	0.40	1.03
1972	0.34	0.15	0.37	0.44
1976	0.22	0.28	0.25	0.32

Year	Dieldrin			
	Pacific	Central	Mississippi	Atlantic
1965/66	<.01	<.01	<.01	<.01
1969	0.02	0.02	0.04	0.05
1972	0.01	0.02	0.02	0.02
1976	0.02	0.03	0.05	0.06

Year	PCB's			
	Pacific	Central	Mississippi	Atlantic
1965/66	N.A.	N.A.	N.A.	N.A.
1969	0.20	0.20	0.44	1.29
1972	0.11	0.10	0.66	1.24
1976	0.16	0.15	0.23	0.52

8-12 Toxic Residues in U.S. Waterfowl by Flyway, 1965-1976 (cont.)

N.A. - Not Available.

Data measured as mean, parts per million (ppm) wet weight.

Residues are measured in wings of adult mallards sampled in the continental United States as part of the National Pesticide Monitoring Program. Samples are drawn from mallard wings sent to the Fish and Wildlife Service by sportsmen. Residue level in wings reflect those found in the rest of the body. Over 5,000 duck wings are analyzed during each year's collection period.

(1) A derivative of DDT.

(a) Includes DDT and its metabolites.

Sources:

1965/66: Estimated from graph in Walker, Charles R., U.S. Fish and Wildlife Service, "Occurence of PCB in the National Fish and Wildlife Monitoring Program," p. 170.

1969: White, Donald H. and Heath, Robert G., "Nationwide Residues of Organochlorines in Wings of Adult Mallards and Black Ducks, 1972-1973," Pesticides Monitoring Journal, Volume 9, No. 4, March 1976, p. 184.

1972-1976: White, Donald H., U.S. Fish and Wildlife Service, "Nationwide Residues of Organochlorines in Wings of Adult Mallards and Black Ducks, 1976", Pesticides Monitoring Journal, Volume 12, No. 4, March 1979, Table 3, in press.

8-13 Toxic Residues in U.S. Starlings, 1967-1976
(in parts per million - geometric mean)

Year	DDE (1)	Dieldrin	PCB's
1967/68	.579	.084	(a)
1970	.355	.036	.358
1972	.387	.035	.215
1974	.229	.019	.068
1976 (2)	.254	.039	.243

Samples collected through trapping or shooting throughout the continental United States by Fish and Wildlife Service personnel as part of the National Pesticides Monitoring Program. Feet, beaks, wingtips and skins were removed and the remainder of the sample was analyzed. About 1,400 starlings are analyzed each year. Statistics are presented in terms of wet weight.

(1) DDE is a derivative of DDT.

(2) Preliminary data.

(a) Not measured.

Sources:
1967-1974: White, Donald H., "Nationwide Residues of Organochlorines in Starlings, 1974," Pesticides Monitoring Journal, Volume 10, No. 1, June 1976, Table 3, p. 15.
1976: White, Donald H., U.S. Fish and Wildlife Service, "Nationwide Residues of Organochlorines in Starlings, 1976," Pesticides Monitoring Journal, Volume 12, No. 4, March 1979, in press.

8-14 Population Characteristics and Toxic Residues in Brown Pelicans in California, 1969-1975

Year	Population Characteristics: No. Nests Built	No. of Young Fledged	No. of Young Fledged Per Nest	Toxic Residues (1): No. of Eggs in Sample(2)	DDT (3) (ppm)	PCB's (ppm)
1969	1125	4	.004	28	1204	200
1970	727	5	.007	N.A.	N.A.	N.A.
1971	650	42	.065	N.A.	N.A.	N.A.
1972	511	207	.405	10	>221	N.A.
1973	597	134	.255	4	183	43
1974	1286	1185	.922	39	97	146
1975*	N.A.	N.A.	N.A.	4	113	120

N.A. - Not Available.

Areas studied were Southern California and northwestern Baja California, including Anacapa and Santa Cruz Islands and Isle Coronado Norte. Concentrations of toxic residues are in eggs.

(1) Geometric mean concentration in eggs, parts per million (ppm) lipid weight basis.

(2) Intact eggs only.

(3) Includes DDT and all its derivatives.

* Anacapa Island only.

Sources: 1969-1974, Population Characteristics, Eggs in Sample, and DDT: Anderson, Daniel W., et al., "Brown Pelicans: Improved Reproduction off the Southern California Coast," Science, November 21, 1975, Volume 190, No. 4216, p. 807.
1975 data and PCB's, all years: Anderson, Daniel W., et al., "The Status of Brown Pelicans at Anacapa Island in 1975," California Fish and Game, Volume 63, No. 1, 1977, p. 6.

8-15 Population Characteristics and Toxic Residues in Brown Pelicans in South Carolina, 1969-1976

	Population Characteristics			Toxic Residues (1)			
Year	No. of Nests	No. of Young Fledged	No. of Young Fledged Per Nest	No. of Eggs in Sample(2)	DDT(3) (ppm)	Dieldrin (ppm)	PCB's (ppm)
1969	1266	980	.78	15	7.81	1.16	6.11
1970	1116	945	.85	13	5.27	0.82	5.25
1971	1469	1349	.92	65	3.20	0.46	6.49
1972	1415	970	.69	72	3.69	0.45	7.51
1973	1646	2726	1.66	104	2.56	0.45	4.75
1974	1670	1625	.97	115	2.72	0.58	7.63
1975	2400	1800	.75	102	1.80	0.40	6.45
1976	2540	3137	1.23	N.A.	N.A.	N.A.	N.A.

N.A. - Not Available.

Areas studied in South Carolina were Marsh Island in the Cape Romain National Wildlife Refuge and Deveaux Bank. Concentrations of toxic residues are in eggs.

(1) Geometric mean concentration in eggs, parts per million.

(2) Addled and viable eggs in all stages of incubation were collected.

(3) Includes DDT and all its derivatives.

Sources: Blus, Laurence J., et al., Fish and Wildlife Service, "Organochlorine Residues, Eggshell Thickness, Reproduction, and Population Status of Brown Pelicans in South Carolina and Florida, 1969-1976," Pesticides Monitoring Journal, Volume 12, No. 4, March 1979, Tables 1 and 9, in press.

8-16 Population Characteristics and Toxic Residues in Peregrine Falcons, Interior Alaska, 1952-1973

Year	Population Characteristics			Toxic Residues (1)			
	Total No. of Pairs	No. of Pairs Producing Young	No. of Young Fledged	No. of Eggs in Sample	DDE(2) (ppm)	No. of Eggs in Sample	PCB's (ppm)
1952-59	32-36	20-25	40-50	-	N.A.	-	N.A.
1967	27	18	34	-	N.A.	-	N.A.
1968	32	16	34	11	194	-	N.A.
1969	33	13	26	5	164	-	N.A.
1971	25	9	14	7	211	7	174
1973	14	4	9	-	N.A.	-	N.A.

N.A. - Not Available.

Area studied was the Colville River in northwestern Alaska. Concentrations of toxic residues are in eggs.

(1) Mean concentration in eggs, parts per million oven-dry weight. To convert to wet-weight values, multiply dried weight by 5.

(2) DDE is a derivative of DDT.

Source: Peakall, David B., et. al., "Organochlorine Residues in Alaskan Peregrines," Pesticides Monitoring Journal, March 1975, Volume 8, No. 4, pp. 256, 257, and 259.

ENERGY

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9-1 U.S. Energy Consumption, by Fuel Type, 1850-1977 (in quads) (1)

Year	Total	Coal	Natural Gas	Petroleum	Hydropower	Nuclear Power	Fuel Wood
1850	2.3	.2					2.1
1860	3.1	.5					2.6
1870	4.0	1.0					2.9
1880	5.0	2.0		.1			2.9
1890	7.1	4.1	.3	.2			2.5
1900	9.6	6.8	.3	.2	.3		2.0
1910	16.6	12.7	.5	1.0	.5		1.9
1920	21.3	15.5	.8	2.6	.8		1.6
1930	23.3	13.6	2.0	5.4	.8		1.5
1940	25.0	12.5	2.7	7.5	.9		1.4
1950	35.2	12.9	6.2	13.5	1.4		1.2
1960	44.6	10.1	12.7	20.1	1.7		
1970	67.1	12.7	22.0	29.5	2.7	.2	
1977	76.3	14.1	19.9	36.9	2.5	2.7	

Data do not include energy developed by animals, windmills, watermills, waterwheels, etc. In 1920, there were 25 million draft animals supplying power for industry, agriculture, and transportation.

Details may not add to total due to rounding.

(1) One quad equals one quadrillion British thermal units (Btu). One Btu is the quantity of heat required to raise the temperature of one pound of water one degree Fahrenheit at or near its point of maximum density.

Sources:
1850-1970: U.S. Department of the Interior, Energy Perspectives, February 1975, p. 34.
1977: U.S. Department of Energy, Energy Information Administration, Monthly Energy Review, December 1978, p. 12.

9-2 U.S. Energy Consumption, by Fuel Type, 1947-1977 (in quads) (1)

Year	Total	Coal (2)	Natural Gas (3)	Petroleum (4)	Hydro-power	Nuclear Power	Geo-thermal
1947	32.962	15.824	4.518	11.367	1.253		
1948	33.217	14.897	5.033	11.965	1.322		
1949	31.413	12.631	5.289	12.120	1.373		
1950	33.923	12.913	6.150	13.489	1.371		
1951	36.712	13.225	7.248	14.848	1.391		
1952	36.397	11.868	7.760	15.334	1.435		
1953	37.529	11.893	8.156	16.098	1.382		
1954	36.208	10.195	8.548	16.132	1.333		
1955	39.666	11.540	9.232	17.524	1.370		
1956	41.662	11.752	9.834	18.627	1.449		
1957	41.675	11.168	10.416	18.570	1.521		
1958	41.650	9.839	10.995	19.214	1.592		
1959	43.100	9.810	11.990	19.747	1.551	.002	
1960	44.525	10.140	12.699	20.067	1.614	.005	
1961	45.280	9.906	13.228	20.487	1.641	.018	
1962	47.384	10.189	14.121	21.267	1.782	.025	
1963	49.271	10.714	14.843	21.950	1.730	.034	
1964	51.206	11.264	15.648	22.386	1.873	.035	
1965	53.313	11.908	16.098	23.241	2.027	.039	
1966	56.381	12.495	17.393	24.394	2.040	.059	
1967	58.234	12.256	18.250	25.335	2.311	.082	
1968	61.722	12.659	19.564	27.052	2.314	.133	
1969	64.947	12.733	21.020	28.421	2.625	.148	
1970	67.121	12.698	22.029	29.537	2.614	.232	.011
1971	68.326	12.043	22.469	30.570	2.827	.406	.011
1972	71.606	12.423	22.698	32.966	2.909	.577	.033
1973	74.563	13.294	22.512	34.851	2.978	.885	.043
1974	72.634	12.889	21.732	33.468	3.276	1.215	.054
1975	70.598	12.814	19.948	32.742	3.186	1.839	.069
1976	74.372	13.748	20.344	35.086	3.042	2.037	.078
1977	76.299	14.133	19.931	36.947	2.511	2.674	.078(a)

(1) One quad equals one quadrillion Btu.
(2) Includes anthracite and bituminous coal, lignite and net imports of coke.
(3) Excludes natural gas liquids. Prior to 1971, consumption includes adjustments.
(4) Includes domestically produced crude oil, natural gas liquids, and condensate, plus imported crude oil products.
(a) Preliminary data.

Sources: 1947-1976 and 1977 (Geothermal only): U.S. Department of Energy, Energy Information Administration, Annual Report to Congress, Volume III, 1977, Statistics and Trends of Energy Supply, Demand, and Prices, May 1978, p. 5.
1977 (excluding Geothermal): U.S. Department of Energy, Energy Information Administration, Monthly Energy Review, December 1978, p. 12.

9-3 U.S. Energy Production, by Fuel Type, 1850-1977
(in quads) (1)

Year	Total Energy Production	Coal (2)	Natural Gas (3)	Crude Oil	Hydro-power	Nuclear Power	Geo-thermal
1850	.216	.216					
1860	.519	.516		.003			
1870	1.074	1.043		.031			
1880	2.210	2.058		.152			
1890	4.619	4.096	.257	.266			
1900	7.893	7.020	.254	.369	.250		
1910	15.375	13.074	.547	1.215	.539		
1920	21.365	17.175	.883	2.569	.738		
1930	22.119	14.011	2.148	5.208	.752		
1940	25.088	13.380	2.979	7.849	.880		
1950	34.352	14.647	6.841	11.449	1.415		
1960	41.547	11.140	14.135	14.664	1.608	.005	
1970	61.804	15.248	24.154	19.772	2.630	.232	.011
1977	60.223	15.926	21.888	17.315	2.331	2.674	.078(a)

(1) One quad equals one quadrillion Btu.

(2) Includes bituminous coal and Pa. anthracite.

(3) Includes natural gas liquids.

(a) Preliminary data.

Sources:
1850-1970: U.S. Bureau of the Census, Historical Statistics of the United States, Colonial Times to 1970, pp. 587-588.
1960-1970 Nuclear and all Geothermal: U.S. Department of Energy, Energy Information Administration, Annual Report to Congress, Volume III, 1977, Statistics and Trends of Energy Supply, Demand, and Prices, May 1978, p. 3.
1977 (excluding Geothermal): U.S. Department of Energy, Energy Information Administration, Monthly Energy Review, December 1978, p. 4.

9-4 U.S. Energy Production, by Fuel Type, 1947-1977
(in quads) (1)

Year	Total	Coal (2)	Natural Gas (3)	Crude Oil (4)	Hydro-power	Nuclear Power	Geo-thermal
1947	34.981	17.975	5.012	10.771	1.223		
1948	35.788	17.158	5.615	11.717	1.298		
1949	30.500	12.557	5.911	10.683	1.349		
1950	34.277	14.647	6.841	11.449	1.340		
1951	37.570	15.066	8.106	13.037	1.361		
1952	36.653	13.262	8.705	13.282	1.404		
1953	36.910	12.767	9.116	13.671	1.356		
1954	35.221	11.001	9.488	13.427	1.305		
1955	38.956	12.695	10.532	14.407	1.322		
1956	41.576	13.747	11.252	15.179	1.398		
1957	41.988	13.444	11.885	15.179	1.480		
1958	39.204	11.201	12.244	14.204	1.555		
1959	40.915	11.105	13.361	14.935	1.512	.002	
1960	41.781	11.140	14.135	14.935	1.566	.005	
1961	42.285	10.751	14.691	15.208	1.617	.018	
1962	43.899	11.211	15.365	15.521	1.777	.025	
1963	46.186	12.176	16.271	15.967	1.738	.034	
1964	48.045	12.854	17.138	16.165	1.853	.035	
1965	49.637	13.395	17.652	16.524	2.027	.039	
1966	52.470	13.836	18.984	17.562	2.029	.059	
1967	55.348	14.215	20.087	18.653	2.311	.082	
1968	57.258	13.955	21.548	19.308	2.314	.133	
1969	59.381	14.223	22.838	19.558	2.614	.148	
1970	62.640	15.248	24.154	20.402	2.593	.232	.011
1971	61.650	13.607	24.805	20.031	2.790	.406	.011
1972	62.765	14.500	24.785	20.041	2.829	.577	.033
1973	62.386	14.382	24.754	19.493	2.829	.885	.043
1974	61.170	14.487	23.696	18.575	3.143	1.215	.054
1975	60.173	15.394	22.019	17.730	3.122	1.839	.069
1976	60.025	15.868	21.827	17.263	2.952	2.037	.078
1977	60.223	15.926	21.888	17.315	2.331	2.674	.078(a)

(1) One quad equals one quadrillion Btu.

(2) Includes anthracite and bituminous coal and lignite.

(3) Includes natural gas liquids.

(4) Includes lease condensate.

(a) Preliminary data.

Sources:
1947-1976 and 1977 (Geothermal only): U.S. Department of Energy, Energy Information Administration, Annual Report to Congress, Volume III, 1977, Statistics and Trends of Energy Supply, Demand, and Prices, May 1978, p. 3.
1977 (excluding Geothermal): U.S. Department of Energy, Energy Information Administration, Monthly Energy Review, December 1978, p. 4.

9-5 Trade in Mineral Fuels, 1947-1977
(in quads) (1)

Year	Exports				Imports				Net Trade (2)			
	Total	Coal	Petroleum (3)	Natural Gas	Total	Coal (4)	Petroleum (3)	Natural Gas	Total	Coal	Petroleum (3)	Natural Gas
1947	2.971	2.015	.944	.019	.962	.008	.954		2.016	2.007	-.010	.019
1948	2.178	1.373	.786	.019	1.159	.008	1.151		1.019	1.365	-.365	.019
1949	1.560	.856	.683	.021	1.407	.008	1.399		.153	.848	-.716	.021
1950	1.432	.766	.639	.027	1.872	.010	1.862		-.440	.756	-1.223	.027
1951	2.550	1.637	.888	.025	1.865	.008	1.857		.685	1.629	-.969	.025
1952	2.304	1.365	.911	.028	2.113	.008	2.097	.008	.191	1.357	-1.186	.020
1953	1.836	.954	.853	.029	2.292	.007	2.285		-.456	.947	-1.432	.029
1954	1.651	.885	.736	.030	2.301	.005	2.289	.007	-.650	.880	-1.553	.023
1955	2.297	1.493	.772	.032	2.748	.009	2.728	.011	-.451	1.484	-1.956	.021
1956	2.969	2.022	.910	.037	3.180	.009	3.160	.011	-.211	2.013	-2.250	.026
1957	3.463	2.218	1.202	.043	3.504	.010	3.455	.039	-.041	2.208	-2.253	.004
1958	2.057	1.444	.573	.040	3.874	.008	3.725	.141	-1.871	1.436	-3.152	-.101
1959	1.529	1.071	.439	.019	4.024	.010	3.875	.139	-2.495	1.061	-3.436	-.120
1960	1.467	1.044	.411	.012	4.123	.007	3.955	.161	-2.656	1.037	-3.544	-.149
1961	1.375	1.001	.363	.011	4.440	.004	4.209	.227	-3.065	.997	-3.846	-.216
1962	1.469	1.103	.350	.016	4.994	.006	4.572	.416	-3.525	1.097	-4.222	-.400
1963	1.821	1.376	.427	.018	5.079	.005	4.654	.420	-3.258	1.371	-4.227	-.402
1964	1.780	1.351	.412	.017	5.374	.008	4.909	.457	-3.594	1.343	-4.497	-.440
1965	1.823	1.418	.378	.027	5.825	.005	5.349	.471	-4.002	1.413	-4.971	-.444
1966	1.806	1.381	.400	.025	6.092	.005	5.592	.495	-4.286	1.376	-5.192	-.470
1967	2.109	1.382	.643	.084	6.072	.006	5.484	.582	-3.963	1.376	-4.841	-.498
1968	1.987	1.407	.483	.097	6.785	.006	6.106	.673	-4.798	1.401	-5.623	-.576
1969	2.099	1.564	.482	.053	7.558	.003	6.805	.750	-5.459	1.561	-6.323	-.697
1970	2.610	1.991	.547	.072	8.235	.001	7.388	.846	-5.625	1.990	-6.841	-.774
1971	2.115	1.569	.463	.083	9.373	.003	8.406	.964	-7.258	1.566	-7.943	-.881
1972	2.089	1.545	.464	.080	11.160	.001	10.112	1.047	-9.071	1.544	-9.648	-.967
1973	2.059	1.497	.483	.079	14.552	.031	13.466	1.055	-12.493	1.466	-12.983	-.976
1974	2.230	1.685	.467	.079	14.175	.141	13.052	.982	-11.944	1.544	-12.585	-.903
1975	2.361	1.850	.437	.074	13.900	.079	12.848	.973	-11.539	1.771	-12.411	-.899
1976	2.124	1.593	.465	.066	16.700	.064	15.653	.983	-14.576	1.529	-15.188	-.917
1977	1.984	1.443	.480	.061	19.702	.092	18.590	1.020	-17.718	1.351	-18.110	-.959

1977 data are preliminary.

(1) One quad equals one quadrillion Btu.
(2) Net Trade = exports minus imports.
(3) Includes natural gas liquids.
(4) Includes imports of coke, not significant before 1973.

Source: U.S. Department of Energy, Energy Information Administration, Annual Report to Congress, Volume III, 1977, Statistics and Trends of Energy Supply, Demand, and Prices, May 1978, p. 9.

9-6 U.S. Energy Consumption, by Sector, 1947-1977
(in quads) (1)

Year	Total	Residential & Commercial	Industrial & Miscellaneous	Transportation	Electricity Generation (2)	Unaccountable
1947	33.0	6.8	12.8	8.8	4.3	- 0.1
1948	33.2	7.0	12.3	8.8	4.7	0.6
1949	31.4	6.9	11.4	8.1	4.6	
1950	33.9	7.6	12.4	8.6	5.0	
1951	36.7	7.9	13.7	9.2	5.3	0.3
1952	36.4	8.0	13.1	9.2	5.5	0.3
1953	37.5	7.8	13.8	9.2	5.9	0.6
1954	36.2	8.0	12.5	9.1	5.9	0.5
1955	39.7	8.6	14.1	9.8	6.5	0.5
1956	41.7	9.0	14.6	10.1	7.1	0.8
1957	41.7	8.7	14.5	10.2	7.3	0.9
1958	41.7	9.5	13.5	10.3	7.3	1.0
1959	43.1	9.7	14.0	10.4	7.9	1.1
1960	44.5	10.2	14.6	10.8	8.3	0.6
1961	45.3	10.4	14.6	11.0	8.5	0.8
1962	47.4	10.9	15.2	11.4	9.1	0.8
1963	49.3	11.0	15.9	12.0	9.7	0.7
1964	51.2	11.1	16.7	12.3	10.4	0.7
1965	53.3	11.8	17.2	12.7	11.1	0.6
1966	56.4	12.4	18.0	13.3	12.1	0.6
1967	58.2	13.0	18.2	14.0	12.7	0.4
1968	61.7	13.1	19.4	15.2	13.9	0.2
1969	64.9	13.6	20.1	15.8	15.3	0.2
1970	67.1	14.0	20.4	16.3	16.2	0.3
1971	68.3	14.5	19.3	17.1	17.2	0.3
1972	71.6	14.9	19.9	18.1	18.5	0.3
1973	74.6	14.9	21.3	18.7	19.7	
1974	72.6	14.2	20.5	18.0	19.9	
1975	70.6	14.1	18.2	18.1	20.2	
1976	74.4	14.7	19.2	19.1	21.4	
1977	75.8	14.8	18.8	19.7	22.5	

Data may not add to total due to rounding.

1977 data are preliminary.

(1) One quad equals one quadrillion Btu.
(2) Includes electricity generation from geothermal sources.

Source: U.S. Department of Energy, Energy Information Administration, Annual Report to Congress, Volume III, 1977, Statistics and Trends of Energy Supply, Demand, and Prices, May 1978, p. 7.

9-7 U.S. Energy Consumption, by End Use (1), 1973-1977
(in quads) (2)

Year	Total	Residential and Commercial	Trans-portation	Industrial and Miscellaneous
1973	74.6	26.5	18.9	29.2
1974	72.6	25.9	18.2	28.5
1975	70.6	26.1	18.4	26.1
1976	74.4	27.2	19.4	27.8
1977	76.3	28.2	19.9	28.2

(1) Includes electricity distributed and distribution losses.

(2) One quad equals one quadrillion Btu.

Sources:
1973-1976: U.S. Department of Energy, Energy Information Administration, Annual Report to Congress, Volume III, 1977, Statistics and Trends of Energy Supply, Demand, and Prices, May 1978, p. 7.
1977: U.S. Department of Energy, Energy Information Administration, Monthly Energy Review, December 1978, p. 14.

9-8 Energy Consumption and Gross Domestic Product for Four Selected Countries, 1961-1976

Year	United States		West Germany		Netherlands		United Kingdom	
	Energy Consumption Per Capita (tons of oil equivalent)	GDP Per Capita (1)	Energy Consumption Per Capita (tons of oil equivalent)	GDP Per Capita (1)	Energy Consumption Per Capita (tons of oil equivalent)	GDP Per Capita (1)	Energy Consumption Per Capita (tons of oil equivalent)	GDP Per Capita (1)
1961	5.60	2,851	2.67	1,470	1.98	1,045	3.20	1,440
1962	5.79	3,023	2.85	1,588	2.17	1,118	3.27	1,497
1963	5.94	3,141	3.04	1,672	2.37	1,197	3.39	1,579
1964	6.10	3,309	3.09	1,824	2.44	1,388	3.40	1,708
1965	6.30	3,536	3.15	1,962	2.59	1,532	3.55	1,827
1966	6.61	3,827	3.16	2,065	2.68	1,638	3.53	1,934
1967	6.73	4,003	3.15	2,092	2.81	1,785	3.52	1,994
1968	7.04	4,321	3.39	2,252	3.10	1,950	3.65	1,872
1969	7.41	4,610	3.70	2,532	3.37	2,180	3.75	1,990
1970	7.66	4,789	3.89	3,069	3.78	2,431	3.83	2,189
1971	7.79	5,125	3.89	3,537	3.85	2,812	3.78	2,492
1972	8.10	5,594	4.06	4,200	4.40	3,430	3.85	2,810
1973	8.29	6,189	4.29	5,546	4.59	4,475	4.00	3,147
1974	8.04	6,639	4.19	6,137	4.50	5,225	3.83	3,417
1975	7.73	7,148	3.91	6,771	4.33	6,050	3.63	4,071
1976	8.11	7,912	4.23	7,247	4.73	6,501	3.69	3,914

(1) GDP (Gross Domestic Product) in U.S. dollars. GDP measures a nation's domestic economic activity, excluding net factor income originating in overseas enterprises and investments. GDP as shown here is computed using market exchange rates (current prices and current exchange rates). An alternative approach, one that is considered more accurate in making cross-national comparisons but for which data are rarely available, is based on purchasing-power-parity exchange rates. For further information and data on these methods and their application in comparing energy use across countries, see Darmstadter, Joel, et al., Resources for the Future, How Industrial Societies Use Energy - A Comparative Analysis, Johns Hopkins University Press, 1977, p. 4.

Sources:

Energy Consumption: Organisation for Economic Cooperation and Development, International Energy Agency, Energy Balances of OECD Countries, 1974/1976, published 1978, p. 26.

Gross Domestic Product and Population: Organisation for Economic Cooperation and Development, National Accounts of OECD Countries, 1976, Volume I, 1978.

9-9 Energy/Output Ratios (1) for Nine Selected Countries, by Sector, 1972

Country	Energy/ Output Ratio, All Sectors	Transformation Losses		Household and Commercial		Industrial (2)		Transportation	
		Energy/ Output Ratio	Percent of Total Energy Consumption	Energy/ Output Ratio	Percent of Total Energy Consumption	Energy/ Output Ratio	Percent of Total Energy Consumption	Energy/ Output Ratio	Percent of Total Energy Consumption
United States	1.0	.17	17	.25	25	.36	36	.22	22
Canada	1.2	.27	23	.32	27	.40	33	.21	17
France	0.54	.09	18	.15	28	.22	39	.08	15
West Germany	0.70	.11	16	.20	29	.29	42	.09	13
Italy	0.62	.09	15	.15	24	.28	46	.09	15
Netherlands	0.86	.11	13	.28	32	.38	44	.09	10
United Kingdom	0.76	.17	23	.18	24	.31	40	.10	13
Sweden	0.72	.18	25	.24	33	.22	31	.08	11
Japan	0.57	.10	17	.11	19	.30	51	.07	12

Based on U.S. Ratio = 1.0.

(1) The ratio of energy consumption of a country to its gross domestic product.

(2) Includes non-energy uses.

Source: Darmstadter, Joel, et al., Resources for the Future, How Industrial Societies Use Energy - A Comparative Analysis, Johns Hopkins University Press, 1977, p. 187.

9-10 U.S. Coal Production, by Underground and Surface Mining, 1900-1977

Year	Total	Underground	Surface (1)
1900	270	N.A.	N.A.
1901	293	N.A.	N.A.
1902	302	N.A.	N.A.
1903	357	N.A.	N.A.
1904	352	N.A.	N.A.
1905	393	N.A.	N.A.
1906	414	N.A.	N.A.
1907	480	N.A.	N.A.
1908	416	N.A.	N.A.
1909	461	N.A.	N.A.
1910	502	N.A.	N.A.
1911	496	N.A.	N.A.
1912	534	N.A.	N.A.
1913	570	N.A.	N.A.
1914	513	N.A.	N.A.
1915	531	N.A.	N.A.
1916	590	N.A.	N.A.
1917	651	N.A.	N.A.
1918	678	N.A.	N.A.
1919	552	N.A.	N.A.
1920	658	N.A.	N.A.
1921	505	N.A.	N.A.
1922	476	N.A.	N.A.
1923	656	N.A.	N.A.
1924	570	N.A.	N.A.
1925	581	N.A.	N.A.
1926	656	N.A.	N.A.
1927	596	N.A.	N.A.
1928	575	N.A.	N.A.
1929	608	N.A.	N.A.
1930	536	N.A.	N.A.
1931	442	417	25
1932	360	234	26
1933	383	356	27
1934	416	387	39
1935	425	393	32
1936	491	453	37
1937	499	458	41
1938	495	457	38
1939	448	402	46
1940	441	419	42
1941	516	460	56
1942	581	516	65
1943	652	556	96
1944	684	561	123
1945	731	502	129
1946	594	460	134
1947	685	531	154
1948	649	494	155
1949	479	358	121
1950	562	425	317
1951	574	444	130
1952	510	384	126
1953	486	367	119
1954	420	306	114
1955	491	360	131
1956	528	379	149
1957	515	371	144
1958	532	397	135
1959	431	292	139
1960	435	293	142
1961	421	280	141
1962	440	288	152
1963	479	309	170
1964	505	328	177
1965	528	338	190
1966	545	342	203
1967	561	350	210
1968	553	345	209
1969	569	348	222
1970	610	340	270
1971	563	278	285
1972	535	288	247
1973	558	286	272
1974	566	264	302
1975	611	279	332
1976	647	281	366
1977	665	257	409

N.A. - Not Available.

Details may not add to totals due to rounding.

Includes bituminous, anthracite, and lignite.

(1) 1967-1977 includes strip and auger mines, culm banks, and dredges.

Sources:
1900-1913: U.S. Department of the Interior, Bureau of Mines, Coal Mining Fatalities in the U.S., 1870-1914, with Statistics of Coal Production, Labor, and Mining Methods by States and Calender Years, published 1916, p. 10.
1914-1966: Bituminous Coal Operators, unpublished data; and Pennsylvania Department of the Environment, unpublished data.
1967-1977: U.S. Department of Labor, Mine Safety and Health Administration, Injury Experience in Coal Mining, Informational Reports, annual issues; and U.S. Department of Labor, Mine Safety and Health Administration, unpublished data.

9-11 Surface Land Used and Reclaimed by the Coal Mining Industry, 1930-1977

Use	1930-1971 (1)				1930-1977 (2)			
	Land Used		Land Reclaimed		Land Used		Land Reclaimed	
	Thousands of Acres	Percent of Total Land Used	Thousands of Acres	Percent of Total Land Used	Thousands of Acres	Percent of Total Land Used	Thousands of Acres	Percent of Total Land Used
Surface Mining (3)	966.0	61.5	716.0	45.6	1,805.9 (a)	79.5 (a)	1,452.1 (a)	63.9 (a)
Disposal of Overburden and Other Mine Waste from Surface Mining	320.0	20.4	268.0	17.1	(b)	(b)	(b)	(b)
Disturbed as a Result of Underground Workings	87.9	5.6	4.0	0.3	N.A.	N.A.	N.A.	N.A.
Disposal of Underground Mine Waste	166.0	10.6	20.0	1.3	164.2	7.2	22.5	1.0
Disposal of Coal-cleaning Plant Wastes	31.9	2.0	6.5	0.4	38.9	1.7	9.0	0.4
Total, All Uses	1,570.0	100.0	3,010.0	64.3	2,271.3	100.0	1,483.6	65.3

N.A. - Not Available.

Excludes state and private reclamation efforts.

Details may not add to totals due to rounding.

(1) Includes bituminous, lignite, and anthracite coal and peat. Bituminous coal and lignite account for about 98 percent of the land area used.

(2) Preliminary data. Includes bituminous coal and lignite only.

(3) Area of excavation only.

(a) Includes Disposal of Overburden and Other Mine Waste from Surface Mining.

(b) Included in Surface Mining.

Sources:
1930-1971: U.S. Department of the Interior, Bureau of Mines, Land Utilization and Reclamation in the Mining Industry, 1930-1971, Bureau of Mines Information Circular 8642, 1974, p. 16.
1930-1977: U.S. Department of the Interior, Bureau of Mines, unpublished data.

9-12 U.S. Coal Deaths from Accidents, by Underground and Surface Mining, 1906-1978

Year	Total	Underground (1)	Surface (2)
1906	2,138	1,960	178
1907	3,242	3,024	218
1908	2,445	2,286	159
1909	2,642	2,492	150
1910	2,821	2,637	184
1911	2,656	2,486	170
1912	2,419	2,220	199
1913	2,785	2,624	161
1914	2,454	2,288	166
1915	2,269	2,109	160
1916	2,226	2,076	150
1917	2,696	2,435	261
1918	2,580	2,333	247
1919	2,323	2,135	188
1920	2,272	2,077	195
1921	1,995	1,875	120
1922	1,984	1,846	138
1923	2,462	2,304	158
1924	2,402	2,264	138
1925	2,234	2,107	127
1926	2,518	2,400	118
1927	2,231	2,109	122
1928	2,176	2,092	84
1929	2,187	2,076	111
1930	2,063	1,950	113
1931	1,463	1,378	85
1932	1,207	1,130	77
1933	1,064	976	88
1934	1,226	1,132	94
1935	1,242	1,144	98
1936	1,342	1,256	86
1937	1,413	1,318	95
1938	1,105	1,027	78
1939	1,078	1,014	64
1940	1,388	1,308	80
1941	1,266	1,166	100
1942	1,471	1,353	118
1943	1,451	1,327	124
1944	1,298	1,166	132
1945	1,068	960	108
1946	968	863	105
1947	1,158	1,047	111
1948	999	880	119
1949	585	508	77
1950	643	547	96
1951	785	707	78
1952	548	474	74
1953	461	409	52
1954	396	342	54
1955	420	352	68
1956	448	390	58
1957	478	424	54
1958	358	315	43
1959	293	251	42
1960	325	274	51
1961	294	256	38
1962	289	244	45
1963	284	245	39
1964	242	210	32
1965	259	223	36
1966	233	194	39
1967	222	174	48
1968	311	268	43
1969	203	149	54
1970	260	206	54
1971	181	141	40
1972	156	122	34
1973	132	99	33
1974	133	90	43
1975	155	111	44
1976	141	110	32
1977	139	110	39
1978	105(a)	68(a)	37(a)

From 1901 to 1978, there were 110,938 deaths in the U.S. due to coal mining.

1906-1909: Includes only those states that maintained complete records of fatal injuries. They represent 98-99 percent of the total production of coal in the U.S.

1910-1978: Includes the entire coal industry.

(1) Includes fatalities from roof and face falls, haulage equipment, gas or dust explosions, explosives, electricity, machinery, pressure bumps and bursts, and inrushes of water or material.

(2) Includes fatalities that occurred at all other work locations, including the associated surface works of underground mines, strip mines, culm banks, dredges, and mechanical-cleaning plants. Beginning in 1955, includes fatalities in auger mines.

(a) Preliminary data.

Sources: U.S. Department of Labor, Mine Safety and Health Administration, Injury Experience in Coal Mining, Informational Report No. 1076, 1978, Table 55, pp. 132-133; and U.S. Department of Labor, Mine Safety and Health Administration, unpublished data.

9-13 Natural Gas and Petroleum Production, 1947-1977

Year	Natural Gas (1) (billion cubic feet)	Crude Oil (2) (million barrels)
1947	4,582	1,857
1948	5,148	2,020
1949	5,420	1,842
1950	6,262	1,974
1951	7,457	2,248
1952	8,014	2,290
1953	8,397	2,357
1954	8,743	2,315
1955	9,405	2,484
1956	10,082	2,617
1957	10,680	2,617
1958	11,030	2,449
1959	12,046	2,575
1960	12,771	2,575
1961	13,254	2,622
1962	13,877	2,676
1963	14,747	2,753
1964	15,547	2,787
1965	16,040	2,849
1966	17,207	3,028
1967	18,171	3,216
1968	19,322	3,329
1969	20,698	3,372
1970	21,921	3,517
1971	22,493	3,454
1972	22,532	3,455
1973	22,648	3,361
1974	21,601	3,203
1975	20,109	3,057
1976	19,952	2,976
1977	20,025	2,985

(1) Includes natural gas liquids.
(2) Includes lease condensate.

Sources:
1947-1976: U.S. Department of Energy, Energy Information Administration, Annual Report to Congress, Volume III, 1977, Statistics and Trends of Energy Supply, Demand, and Prices, May 1978, p. 3.
1977: U.S. Department of Energy, Energy Information Administration, Monthly Energy Review, December 1978, pp. 22 and 40.

9-14 Nuclear Power Capacity and Generation, 1957-1977

Year	Year-End Operating Reactors (1)	Year-End Megawatt Capacity (1)	Electricity Generation	
			Billion Kilowatt Hours	Percent of Total U.S. Generation
1957	1	90	<0.1	<0.1
1958	1	90	0.2	<0.1
1959	1	90	0.2	<0.1
1960	2	290	0.5	0.1
1961	3	465	1.7	0.2
1962	4	730	2.3	0.3
1963	7	942	3.2	0.4
1964	9	917	3.3	0.3
1965	10	933	3.7	0.4
1966	11	1,840	5.5	0.5
1967	10	1,805	7.7	0.6
1968	10	2,792	12.5	0.9
1969	13	4,102	13.9	1.0
1970	16	5,150	21.8	1.4
1971	21	8,472	38.1	2.4
1972	26	13,028	54.1	3.1
1973	35	20,049	83.3	4.5
1974	44	29,690	114.0	6.1
1975	54	38,568	172.5	9.0
1976	57	41,129	191.1	9.4
1977	65	47,013	250.9	11.8

(1) Includes plants shutdown permanently or for extended periods, most of which were test or prototype units.

Source: U.S. Department of Energy, Energy Information Administration, Annual Report to Congress, Volume III, 1977, Statistics and Trends of Energy Supply, Demand, and Prices, May 1978, p. 110.

9-15 Radioactive Wastes, 1973-1976
(in million cubic feet)

Year	Low-Level Wastes			High-Level Wastes		
	Total	Commercial Burial Sites	Federal Burial Sites	Total	Commercial Burial Sites	Federal Burial Sites
1973	9.3	9.3				
1974	11.2	11.2				
1975	13.2	13.2				
1976	66.61	15.8	50.81	9.489	0.082	9.407

Cumulative volume. Excludes spent fuel.

Sources:
Low-Level: U.S. Department of Energy, Report of Task Force for Review of Nuclear Waste Management, draft, February 1978, p. 120; and U.S. Department of Energy and U.S. Environmental Protection Agency, Energy/Environment Fact Book, Decision Series, EPA-600/9-77-041, March 1978, p. 27.
High-Level: U.S. Department of Energy, Report of Task Force for Review of Nuclear Waste Management, draft, February 1978, p. 127.

9-16 Production of Electricity by the Electric Utility Industry, 1947-1977
(in million megawatt hours)

Year	Total	Conventional Steam	Hydro-electric	Internal Combustion	Gas Turbine	Nuclear	Other
1947	255.7	174.5	78.4	2.8			
1948	282.7	196.9	82.5	3.3			
1949	291.1	197.9	89.7	3.5			
1950	329.1	229.5	95.9	3.7			
1951	370.8	267.3	99.8	3.7			
1952	399.2	290.4	105.1	3.7			
1953	442.6	333.5	105.2	3.9			
1954	471.7	360.8	107.1	3.8			
1955	547.0	430.1	113.0	3.9			
1956	600.7	474.6	122.0	4.1			
1957	631.5	497.2	130.2	4.1			
1958	645.2	500.6	140.3	4.1		0.2	
1959	710.1	567.7	137.8	4.4		0.2	
1960	753.3	602.8	145.5	4.5		0.5	
1961	792.0	633.9	151.8	4.6		1.7	
1962	852.4	677.0	168.3	4.8		2.3	
1963	916.8	742.5	165.8	5.0	0.3	3.2	
1964	984.0	798.1	177.1	5.0	0.5	3.3	
1965	1,055.3	851.9	193.9	5.1	0.7	3.7	
1966	1,144.4	937.0	194.8	5.2	1.9	5.5	
1967	1,214.3	977.3	221.5	4.8	3.0	7.7	
1968	1,329.4	1,085.0	222.5	5.2	4.2	12.5	
1969	1,442.2	1,164.3	250.2	5.6	8.2	13.9	
1970	1,491.0	1,201.3	247.1	5.4	15.4	21.8	
1971	1,612.6	1,279.8	266.3	6.2	22.1	38.1	0.1
1972	1,749.6	1,386.5	272.6	6.7	29.5	54.1	0.2
1973	1,863.5	1,471.0	272.3	6.6	30.1	83.3	0.2
1974	1,867.1	1,413.7	301.0	6.0	32.1	114.0	0.3
1975	1,917.6	1,416.7	300.0	5.7	22.4	172.5	0.3
1976	2,037.7	1,533.9	283.7	5.0	23.6	191.1	0.4
1977	2,124.1	1,618.8	220.4	4.7	28.9	250.9	0.4

Source: U.S. Department of Energy, Energy Information Administration, Annual Report to Congress, Volume III, 1977, Statistics and Trends of Energy Supply, Demand, and Prices, May 1978, p. 99.

9-17 Production of Solar Collectors and Photovoltaic Cells, 1974-1978

Year	Solar Collectors (1)		Photovoltaic Cells(2) (thousand watts)
	Medium-Temperature (3) (thousand square feet)	Low-Temperature (4) (thousand square feet)	
1974	136.5	1,137.2	N.A.
1975	717.3	3,026.0	200
1976	1,924.7	3,875.8	350
1977	3,769.6 (a)	6,444.4 (a)	750
1978	N.A.	N.A.	1,500(a)

N.A. - Not Available.

(1) Quantity manufactured. Solar collectors are insulated devices in which a liquid (or air) is heated by sunlight and flows directly from the collector to a heat exchanger or to the system itself.

(2) Photovoltaic cells convert sunlight directly into electricity. They are made of thin sheets of silicone and have no moving parts.

(3) Medium temperature collectors are primarily used for heating or cooling space and heating domestic water. They generally operate between the temperatures of 140 and 180 degrees Fahrenheit.

(4) Low temperature collectors are primarily used to heat swimming pools. They operate between the temperatures of 70 and 90 degrees Fahrenheit.

(a) Estimated by the U.S. Department of Energy.

Sources:
Solar Collectors: U.S. Department of Energy, Energy Information Administration, Annual Report to Congress, Volume III, 1977, Statistics and Trends of Energy Supply, Demand, and Prices, May 1978, p. 121.
Photovoltaic Cells: U.S. Department of Energy, unpublished data.

10

WATER RESOURCES

10-1 Freshwater Surface Supplies in the United States, by Region, 1975 (1)

Region No. & Name	Drainage Area (thousands of acres)	Regional Streamflow Discharge (billion gallons/day)			
		Mean	Discharge in Excess of:		
			50% of the Year	80% of the Year	95% of the Year
1. New England	44,162	78.2	77.4	62.7	48.3
2. Mid-Atlantic	66,139	79.2	77.8	61.2	48.4
3. South Atlantic-Gulf	173,630	228.0	219.3	164.1	121.8
4. Great Lakes	85,871	72.7	71.7	57.3	44.9
5. Ohio	102,436	178.0	178.0	141.0	105.0
6. Tennessee	27,290	40.8	40.8	35.9	31.4
7. Upper Mississippi	115,631	121.0	121.0	91.8	65.3
8. Lower Mississippi	67,292	433.0	433.0	282.0	202.0
9. Souris-Red-Rainy	35,021	6.0	5.6	3.4	1.8
10. Missouri	327,133	44.1	43.2	29.9	17.6
11. Arkansas-White-Red	156,163	62.6	59.1	37.4	21.6
12. Texas-Gulf	113,726	28.3	22.9	12.3	6.3
13. Rio Grande	87,764	1.2	0.6	0.3	0.2
14. Upper Colorado	65,848	10.0	10.0	7.0	3.9
15. Lower Colorado	99,103	1.6	1.6	1.4	1.2
16. Great Basin	89,181	2.6	2.4	1.6	1.2
17. Pacific Northwest	173,366	255.3	254.3	213.3	179.7
18. California	105,497	47.4	44.3	29.8	19.5
19. Alaska	375,304	905.0	898.0	795.0	705.0
20. Hawaii	4,126	6.7	6.3	4.9	3.8
21. Caribbean	2,283	4.9	4.5	3.3	1.6
Conterminous U.S. (2) (#1-18)	1,935,253	1,233.4	1,210.9	889.4	675.3
Total U.S., All Regions (2) (#1-21)	2,316,966	2,150.0	2,119.6	1,692.6	1,385.8

(1) Preliminary data.

(2) Total discharge includes only those regions that are outflow pionts, that is, flowing out of the country. Does not include interior regions and subsequent double counting of flow.

Sources:
Drainage Area: Water Resources Council, The Nation's Water Resources, Statistical Appendix, Volume A-1, Table 4, draft, April 1978.
Streamflow: Water Resources Council, unpublished preliminary data.

10-2 Groundwater Supplies in the United States, by Region, 1975 (1)

Region No. & Name	Current Withdrawals		Current Groundwater in Storage		
	Total Withdrawals (billion gallons/day)	Amount Withdrawn in Excess of Natural or Man's Recharge (billion gallons/day)	Total at Less than 2500 Feet (trillion gallons)	Amount That Can Be Feasibly Withdrawn (trillion gallons)	Length of Time to Deplete Half of Storage at Current Rates of Withdrawal (2) (years)
1. New England	0.6	0	N.A.	N.A.	Over 2000
2. Mid-Atlantic	2.7	0.03	1,611	414	Over 2000
3. South Atlantic-Gulf	5.5	0.3	N.A.	4,460	Over 2000
4. Great Lakes	1.2	0.03	N.A.	261	Over 2000
5. Ohio	1.8	0	1,399	383	Over 2000
6. Tennessee	0.3	0	N.A.	530	Over 2000
7. Upper Mississippi	2.4	0	4,638	2,243	Over 2000
8. Lower Mississippi	4.8	0.4	2,596	1,272	Over 2000
9. Souris-Red-Rainy	0.1	0	703	172	Over 2000
10. Missouri	10.4	2.5	1,118	445	235
11. Arkansas-White-Red	8.8	5.5	664	499	125
12. Texas-Gulf	7.2	5.6	2,803	1,434	350
13. Rio Grande	2.3	0.7	16,033	1,874	Over 2000
14. Upper Colorado	0.1	0	1,054	78	Over 2000
15. Lower Colorado	5.0	2.4	571	N.A.	325
16. Great Basins	1.4	0.6	944	171	390
17. Pacific Northwest	7.4	0.6	1,377	180	410
18. California	19.2	2.2	327	82	51
19. Alaska	0.04	0	N.A.	1,122	Over 2000
20. Hawaii	0.9	0	N.A.	N.A.	Over 2000
21. Caribbean	0.3	0.01	N.A.	16	Over 2000
Total U.S., All Regions (#1-21)	82.4	20.9	35,838	15,636	

N.A. - Not Available.

(1) Preliminary data.

(2) Subregions may have critical problems that do not show up at the regional level.

Source: Water Resources Council, The Nation's Water Resources, Summary Report, draft, April 1978, p. 11.

10-3 Large Rivers in the United States

Rank (1)	River	Drainage Area (square miles)	Average Discharge, 1941-1970 (cubic feet per second)	Length (miles)	Most Distant Source	Mouth
1	Mississippi	1,247,266	640,000 (a,b)	3,710 (c)	Source of Red Rock River, Mont.	Gulf of Mexico
2	Columbia	258,000	262,000	1,243	Columbia Lake, B.C.	Pacific Ocean
3	Ohio	203,900	258,000	1,306	Source of Allegheny River, Potter Co., Pa.	Mississippi River
4	St. Lawrence	302,000	243,000 (d)	N.A.	N.A.	N.A.
5	Yukon	327,600	240,000 (e)	1,770	Coast Mountains, B.C.	Bering Sea
6	Atchafalaya	95,105	183,000	135	Eastern edge of New Mexico	Gulf of Mexico
7	Mississippi above Missouri River	171,600	98,400	1,170	Lake Itasca, Minn.	Confluence with Missouri River
8	Missouri	529,400	76,300	2,533	Source of Red Rock River, Mont.	Mississippi River
9	Tennessee	40,910	N.A. (f,g)	900	Southwest Virginia, No. Fork Holston River	Ohio River
10	Red	93,244	62,300	1,270	Eastern edge of New Mexico	Atchafalaya River
11	Mobile	43,800	61,400 (h)	780	Northwest Georgia	Mobile Bay
12	Snake	109,000	50,000	1,038	Ocean Plateau, Teton Co., Wyo.	Columbia River
13	Arkansas	160,600	45,100	1,450	Lake Co., Colo.	Mississippi River
14	Susquehanna	27,570	37,190	444	Otsego Lake, Otsego Co., N.Y.	Chesapeake Bay
15	Willamette	11,200	35,660	270	Tumblebug Creek, Douglas Co., Oreg.	Columbia River
16	Alabama	22,600	32,400	735	Northwest Georgia	Mobile River

10-3 Large Rivers in the United States (cont.)

Rank (1)	River	Drainage Area (square miles)	Average Discharge, 1941-1970 (cubic feet per second)	Length (miles)	Most Distant Source	Mouth
17	White	28,000	32,100	720	Madison Co., Ark.	Mississippi River
18	Wabash	33,150	30,400	529	Darke Co., Ohio	Ohio River
19	Pend Oreille	25,820	29,900	490	Near Butte, Mont.	Columbia River
20	Tombigbee	20,100	27,300	525	Northeast Mississippi	Mobile River
21	Cumberland	18,080	N.A. (f,g)	720	Poor Fork, Letcher Co., Ky.	Ohio River
22	Sacramento	27,100	N.A. (g)	377	Siskiyou Co., Calif.	Suisun Bay
23	Apalachicola	19,600	24,700	524	Source of Chattahoochee River, Towns Co., Ga.	Gulf of Mexico
24	Illinois	27,900	22,800	420	Source of Kankakee River, St. Joseph Co., Ind.	Mississippi River
25	Colorado	242,900	N.A. (i)	1,360	Rocky Mountain National Park, Colo.	Gulf of California
26	Hudson	13,370	19,500	306	Essex Co., N.Y.	Upper New York Bay
27	Allegheny	11,700	19,290	325	Source of Allegheny River, Potter Co., Pa.	Ohio River
28	Delaware	11,440	17,200 (j)	390	Source of West Branch, Schoharie Co., N.Y.	Delaware Bay

N.A. - Not Available.

(1) Rivers are ordered according to average discharge at mouth.

(a) At Baptiste Collette Bayou, La.
(b) About 25 percent of the flow of the Mississippi River system occurs in the Atchafalaya River. Combined flow of Mississippi and Atchafalaya Rivers is 640,000 cubic feet per second. Flow of Mississippi River channel at mouth is 453,000 cubic feet per second.
(c) Measured from the mouth of the Mississippi River and along its watercourse and that of the Missouri River to the source of Red Rock River in Montana. The length from the mouth of the Mississippi River to its source in Minnesota is 2,340 miles.
(d) At international boundary, lat. 45 degrees. Includes flow of St. Regis River.
(e) Average is for 1957-70 period; station operated only since 1956.
(f) Interbasin diversion beginning June 1966 between Lake Barkley on Cumberland River and Lake Kentucky on Tennessee River through Barkley-Kentucky Canal.
(g) Rank is according to the average discharge at the most downstream station where data is available.
(h) At Bankhead Tunnel.
(i) At Arizona-Sonora boundary: natural flow not accurately known because of large depletions for irrigation.
(j) At Liston Point on Delaware Bay.

Source: U.S. Geological Survey, Large Rivers of the United States, Geological Survey Circular 686, 1974, p. 9.

10-4 Use of Water, 1900-1975
(in billion gallons per day)

Year	Total Water Withdrawals (1)	Total Consumption (2)
1900	40	N.A.
1910	66	N.A.
1920	92	N.A.
1930	110	N.A.
1940	136	N.A.
1950	200	N.A.
1955	240	N.A.
1960	270	61
1965	310	77
1970	370	88
1975	420	95

N.A. - Not Available.

(1) Withdrawal: Water taken from a groundwater or surface water source and conveyed to the place of use. If returned to a surface water source, withdrawal of the same water by a downstream user is counted again in computing total withdrawals.

(2) Consumption: Water withdrawn which is no longer available for use because it has been either evaporated, transpired, incorporated into products and crops, consumed by man or livestock or otherwise removed from the water environment.

Sources:
1900-1970 (withdrawals) and 1960-1970 (consumption): National Water Commission, Water Policies for the Future, 1973, Water Information Center Inc., p. 7.
1975 (withdrawals and consumption): U.S. Geological Survey Estimated Use of Water in the United States in 1975, Geological Survey Circular 765, 1977, p. 10.

10-5 Water Withdrawals, by Type, 1900-1975
(in billions of gallons per day)

Year	Total Water Withdrawals	Purpose of Withdrawals				
		Irrigation	Public Water Utilities	Rural Domestic	Industrial & Miscellaneous	Steam Electric Utilities
1900	40	20	3	2.0	10	5
1910	66	39	5	2.2	14	6
1920	92	56	6	2.4	18	9
1930	110	60	8	2.9	21	18
1940	136	71	10	3.1	29	23
1950	200	110	14	3.6	37	40
1955	240	110	17	3.6	39	72
1960	270	110	21	3.6	38	100
1965	310	120	24	4.0	46	130
1970	370	130	27	4.5	47	170
1975	420	140	29	4.9	44	190

Data may not add to total due to rounding.

Includes Puerto Rico.

Sources:
1900-1940: U.S. Dept. of Commerce, Business and Defense Services Administration, Walter L. Picton, Water Use in the United States, 1900-1980, published 1960, p. 2.
1950-1970: U.S. Geological Survey, Estimated Use of Water in the United States in 1970, Geological Survey Circular 676, 1972, p. 10.
1975: U.S. Geological Survey, Estimated Use of Water in the United States, in 1975, Geological Survey Circular 765, 1977, p. 10.

10-6 Water Consumption, by Type, 1960-1975
(in billion gallons per day)

Year	Total Consumption	Purpose of Consumption				
		Irrigation	Public Water Supply	Rural Domestic	Self-Supplied Industrial and Miscellaneous	Steam Electric Utilities
1960	61	52	3.5	2.8	3.0	0.2
1965	77	66	5.2	3.2	3.8	0.4
1970	88	73	5.9	3.4	5.3	1.0
1975	96	80	6.7	3.4	4.2	1.9

Estimates of consumptive use were not tabulated prior to 1960. Data include Puerto Rico.

Sources: U.S. Geological Survey, Estimated Use of Water in the United States, 1960, Geological Survey Circular 456, 1961; U.S. Geological Survey, Estimated Use of Water in the United States, 1965, Geological Survey Circular 556, 1968; U.S. Geological Survey, Estimated Use of Water in the United States in 1970, Geological Survey Circular 676, 1972; and U.S. Geological Survey, Estimated Use of Water in the United States in 1975, Geological Survey Circular 765, 1977.

10-7 Water Withdrawals, by Region, 1960-1975
(in billion gallons per day)

Region No. and Name	1960	1965	1970	1975
1. New England	6.4	7.2	9.7	14.0
2. Mid-Atlantic	27.1	33.6	45.0	52.0
3. South Atlantic-Gulf	18.9	28.4	35.0	43.0
4. Great Lakes	29.0	33.0	39.0	36.0
5. Ohio	24.0	30.0	36.0	36.0
6. Tennessee	7.5	8.2	7.9	11.0
7. Upper Mississippi	11.0	16.0	16.0	19.0
8. Lower Mississippi	5.3	5.2	13.0	16.0
9. Souris-Red-Rainy	0.17	0.30	0.32	0.36
10. Missouri	21.6	20.8	24.0	35.0
11. Arkansas-White-Red	10.4	10.4	12.0	15.0
12. Texas-Gulf	22.0(a)	16.0	21.0	22.0
13. Rio Grande	(a)	7.3	6.3	5.4
14. Upper Colorado	14.0(b)	6.7	8.1	4.1
15. Lower Colorado	(b)	6.6	7.2	8.5
16. Great Basin	7.0	6.9	6.7	6.9
17. Pacific Northwest	29.0	29.0	30.0	33.0
18. California	33.0	38.0	48.0	51.0
19. Alaska	0.20	0.10	0.25	0.20
20. Hawaii	1.6	2.0	2.7	2.5
21. Caribbean	1.2	1.7	3.0	4.1
Total U.S., All Regions	270.0	310.0	370.0	420.0

Data may not add to totals due to rounding.

(a) Includes both Texas-Gulf and Rio Grande regions.

(b) Includes both Upper Colorado and Lower Colorado regions.

Sources: U.S. Geological Survey, Estimated Use of Water in the United States, 1960, Geological Circular 456, 1961, p. 25; U.S. Geological Survey, Estimated Use of Water in the U.S., 1965, Geological Survey Circular 556, 1968, pp. 48, 49; U.S. Geological Survey, Estimated Use of Water in the United States in 1970, Geological Survey Circular 676, 1972, p. 28; and U.S. Geological Survey, Estimated Use of Water in the United States in 1975, Geological Survey Circular 765, 1977, p. 38.

10-8 Water Consumption, by Region, 1960-1975
(in billion gallons per day)

Region No. & Name	1960	1965	1970	1975
1. New England	0.29	0.36	0.41	0.44
2. Mid-Atlantic	1.2	1.5	1.4	1.6
3. South Atlantic-Gulf	2.0	2.7	3.3	3.7
4. Great Lakes	0.93	0.1	1.2	1.1
5. Ohio	0.80	0.94	0.92	1.2
6. Tennessee	0.40	0.40	0.24	0.28
7. Upper Mississippi	0.57	0.73	0.76	0.80
8. Lower Mississippi	1.3	1.0	3.6	5.5
9. Souris-Red-Rainy	0.054	0.070	0.071	0.094
10. Missouri	7.6	10.2	12.0	15.0
11. Arkansas-White-Red	4.1	5.7	6.8	9.0
12. Texas-Gulf	9.2 (a)	7.3	6.2	8.0
13. Rio Grande	(a)	4.2	3.3	3.5
14. Upper Colorado	7.1 (b)	3.3	4.1	1.7
15. Lower Colorado	(b)	3.3	5.0	6.3
16. Great Basin	3.3	3.0	3.2	3.6
17. Pacific Northwest	8.3	11.0	11.0	11.0
18. California	13.0	17.0	22.0	23.0
19. Alaska	0.0007	0.01	0.016	0.0056
20. Hawaii	0.41	0.58	0.81	0.56
21. Caribbean	0.28	0.27	0.17	0.24
Total U.S., All Regions	61.0	78.0	87.0	96.0

Data may not add to totals due to rounding.

(a) Includes both Texas-Gulf and Rio Grande regions.

(b) Includes both Upper Colorado and Lower Colorado regions.

Sources: U.S. Geological Survey, Estimated Use of Water in the United States, 1960, Geological Circular 456, p. 25; U.S. Geological Survey, Estimated Use of Water in the U.S., 1965, Geological Survey Circular 556, pp. 48, 49; U.S. Geological Survey, Estimated Use of Water in the United States in 1970, Geological Survey Circular 676; p. 36; and U.S Geological Survey, Estimated Use of Water in the United States in 1975, Geological Circular 765, p. 38.

WATER QUALITY

11-1 Fecal Coliform Bacteria in Major U.S. Rivers, 1966-1977

River	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
Alabama												
(26 stations) (1)												
Concentration (2)										195		
% in Violation (3)										46		
No. of Observations	(a)	(a)	(a)	(a)	(b)	(b)	(b)	(b)	(b)	24	(b)	(b)
Columbia												
(6 stations) (1)												
Concentration (2)									40.8	20.9	10.0	
% in Violation (3)									28	11	7	
No. of Observations	(a)	(a)	(a)	(a)	(b)	(a)	(a)	(b)	40	56	44	(b)
Delaware												
(38 stations) (1)												
Concentration (2)		1,450	398	436	148	589	661	1,170	1,450	129	126	178
% in Violation (3)		86	64	68	39	64	68	77	77	39	37	48
No. of Observations	(a)	317	1,005	719	1,046	1,088	1,076	1,112	1,065	317	328	324
Hudson												
(15 stations) (1)												
Concentration (2)	3,390			2,630	3,240		1,070	1,380	617			
% in Violation (3)	100			100	96		89	93	67			
No. of Observations	42	(b)	(b)	30	26	(b)	37	44	21	(b)	(a)	(a)
Mississippi												
(64 stations) (1)												
Concentration (2)				83.2	549	417	501	479	380	389	324	427
% in Violation (3)				36	67	57	59	62	58	58	52	64
No. of Observations	(b)	(b)	(b)	22	46	68	202	299	317	372	280	36
Missouri												
(25 stations) (1)												
Concentration (2)				51.3	35.5	224.0	339.0	525.0	1,320	295.0	331.0	3,890
% in Violation (3)				40	28	47	48	60	72	46	44	85
No. of Observations	(a)	(b)	(b)	25	65	60	87	96	319	283	157	41
Ohio												
(34 stations) (1)												
Concentration (2)			676	1,070	661	2,140	562	436	178	331	178	
% in Violation (3)			79	70	67	79	65	59	51	59	46	
No. of Observations	(a)	(b)	56	156	253	151	119	123	83	95	39	(b)
Potomac												
(75 stations) (1)												
Concentration (2)						209.0	110.0	81.3	77.6	151.0	81.3	110.0
% in Violation (3)						49	19	11	2	20	3	11
No. of Observations	(a)	(b)	(b)	(b)	(b)	43	80	104	170	59	39	35
Red												
(15 stations) (1)												
Concentration (2)						1,230	891	912	692	331	97.7	67.6
% in Violation (3)						87	73	82	76	56	28	33
No. of Observations	(a)	(a)	(b)	(b)	(b)	23	33	107	110	108	67	21

11-1 Fecal Coliform Bacteria in Major U.S. Rivers, 1966-1977 (cont.)

River	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
Rio Grande												
(16 stations) (1)												
Concentration (2)					479		1,350	1,000	427	389	347	
% in Violation (3)					63		81	82	72	61	50	
No. of Observations	(a)	(a)	(a)	(b)	27	(b)	154	254	130	122	46	(b)
Susquehanna												
(16 stations) (1)												
Concentration (2)						93.3	195		200	525	525	
% in Violation (3)						32	41		49	80	81	
No. of Observations	(a)	(a)	(a)	(a)	(b)	22	22	(b)	93	60	32	(a)
Tennessee												
(61 stations) (1)												
Concentration (2)			61.7				53.7	35.5	23.4	24.5	25.7	43.6
% in Violation (3)			26				28	18	11	11	11	22
No. of Observations	(a)	(a)	43	(a)	(a)	(b)	25	142	219	194	187	110
Willamette												
(20 stations) (1)												
Concentration (2)		912	398	468	275	174	182	331	204	186	85.1	105
% in Violation (3)		93	82	85	59	50	48	69	55	47	23	31
No. of Observations	(a)	27	304	302	616	611	627	292	569	564	167	524

All observations from all stations with time-series data were analyzed. All stations did not operate continously during this period. Note that some stations took more observations per year than others. Therefore, the data may be biased toward conditions at those stations which monitored fecal coliform bacteria more frequently.

These rivers were picked according to trend data available from 22 waterways analyzed by the U.S. Environmental Protection Agency. The 22 rivers and bays included those meeting three criteria: ten longest rivers (in miles), ten rivers with the highest flow (in cubic feet per second), and the water bodies of the ten largest urban areas.

(1) Number of stations monitoring any water quality parameter. All of these stations did not necessarily monitor fecal coliform bacteria.

(2) Log (or geometric) mean concentration of fecal coliform bacteria in number of cells per 100 milliliters.

(3) Percent of observations exceeding a "violation" of 200 cells per 100 milliliters. This level is the U.S. Environmental Protection Agency's maximum concentration allowable for swimming. It is not necessarily a legal violation.

(a) Not measured or not reported to STORET.

(b) Measured infrequently (less than 20 observations per year).

Source: Council on Environmental Quality, UPGRADE analysis of the U.S. Environmental Protection Agency's STORET data system, unpublished data.

11-2 Dissolved Oxygen in Major U.S. Rivers, 1966-1977

River	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
Alabama												
(26 stations) (1)												
Concentration (2)					7.25	7.42	7.93	7.65	6.84	7.08	7.16	6.32
% in Violation (3)					27	12	6	10	7	5	2	13
No. of Observations	(a)	(a)	(a)	(b)	390	686	979	1,016	2,200	1,965	1,787	1,895
Columbia												
(6 stations) (1)												
Concentration (2)			11.71	11.16					10.28	11.88	11.49	10.88
% in Violation (3)			0	0					0	0	0	0
No. of Observations	(a)	(b)	20	22	(b)	(a)	(a)	(a)	35	44	43	22
Delaware												
(38 stations) (1)												
Concentration (2)	4.06	5.17	5.22	5.64	5.77	7.08	7.80	7.14	7.52	7.33	7.28	7.62
% in Violation (3)	65	50	51	49	46	34	26	31	30	27	25	18
No. of Observations	237	781	1,063	756	1,150	1,148	1,100	1,147	1,104	412	348	391
Hudson												
(15 stations) (1)												
Concentration (2)	4.34			5.21	5.71		6.70	7.61	10.24	9.8	11.75	10.86
% in Violation (3)	75			50	41		30	0	0	2	0	0
No. of Observations	288	(b)	(b)	30	27	(b)	40	240	27	54	24	33
Mississippi												
(64 stations) (1)												
Concentration (2)	8.32	8.30	8.73	8.69	8.60	8.68	8.63	8.51	9.29	9.28	9.59	8.70
% in Violation (3)	1	4	2	3	1	3	4	5	2	2	3	5
No. of Observations	174	236	298	299	331	315	360	568	556	621	502	339
Missouri												
(25 stations) (1)												
Concentration (2)	9.89	10.00	9.93	9.05	10.02	9.77	10.1	9.37	9.68	10.21	10.25	9.94
% in Violation (3)	2	3	0	2	1	2	2	1	3	1	1	1
No. of Observations	161	174	160	124	205	191	175	205	355	314	191	147
Ohio												
(34 stations) (1)												
Concentration (2)	8.71	8.80	9.02	8.38	8.02	7.60	8.97	8.82	8.99	9.86		
% in Violation (3)	5	8	4	11	6	19	2	6	5	0		
No. of Observations	195	223	234	279	330	221	171	157	110	97	(b)	(b)
Potomac												
(75 stations) (1)												
Concentration (2)	7.97	9.28	8.72	7.93	8.19	8.95	8.92	9.02	8.86	8.92	10.25	8.29
% in Violation (3)	18	11	14	20	16	9	10	9	12	4	1	13
No. of Observations	226	265	349	722	1,715	1,381	1,151	1,354	865	659	134	94
Red												
(15 stations) (1)												
Concentration (2)	6.98	7.08	7.59	7.76	8.65	8.02	8.50	7.71	7.88	8.23	8.81	8.42
% in Violation (3)	0	0	0	0	0	2	0	1	1	2	4	4
No. of Observations	34	33	50	53	47	66	87	165	163	163	185	169

11-2 Dissolved Oxygen in Major U.S. Rivers, 1966-1977 (cont.)

River	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
Rio Grande (16 stations) (1)												
Concentration (2)					8.75	9.06	8.33	8.36	7.78	8.45	8.84	9.09
% in Violation (3)					0	0	3	0	7	1	1	1
No. of Observations	(a)	(a)	(a)	(b)	33	21	149	271	100	144	84	70
Susquehanna (16 stations) (1)												
Concentration (2)	11.20	11.05	11.28	10.67	11.31	10.23	10.52	11.06	9.74	10.45	10.66	10.53
% in Violation (3)	0	0	0	0	0	12	4	2	6	2	0	0
No. of Observations	34	47	37	48	59	104	76	54	93	55	50	45
Tennessee (61 stations) (1)												
Concentration (2)	7.96	8.33	8.20	8.35	7.87	8.01	8.41	8.47	8.25	8.17	8.50	8.59
% in Violation (3)	12	5	8	9	9	8	3	3	3	7	3	6
No. of Observations	441	525	628	610	924	1,200	1,424	1,486	1,772	2,166	2,273	1,364
Willamette (20 stations) (1)												
Concentration (2)	7.64	7.60	8.09	9.14	9.04	9.65	9.05	8.69	9.31	10.53	8.91	9.35
% in Violation (3)	11	12	4	0	0	0	0	0	1	0	0	0
No. of Observations	1,524	1,638	1,496	1,176	1,130	889	1,042	1,116	981	604	167	548

All stations with time-series data were analyzed. Values higher than 20 milligrams per liter were excluded. (They may have been poor samples, incorrectly reported, or keypunch errors.) All of these stations did not operate continuously during this period. Note that some stations took more observations per year than others. Therefore, the data may be biased toward conditions at those stations which monitored dissolved oxygen more frequently.

These rivers were picked according to trend data available from 22 waterways analyzed by the U.S. Environmental Protection Agency. The 22 rivers and bays included those meeting three criteria: ten longest rivers (in miles), ten rivers with the highest flow (in cubic feet per second), and the water bodies of the ten largest urban areas.

(1) Number of stations monitoring any water quality parameter. All of these stations did not necessarily monitor dissolved oxygen.

(2) Average annual concentration of dissolved oxygen in milligrams per liter.

(3) Percent of observations below a "violation" of 5.0 milligrams per liter. This level is the U.S. Environmental Protection Agency's minimum concentration required to maintain desirable fish populations. It is not a legal limit.

(a) Not measured or not reported to STORET.

(b) Measured infrequently (less than 20 observations per year).

Source: Council on Environmental Quality, UPGRADE analysis of the U.S. Environmental Protection Agency's STORET data system, unpublished data.

11-3 Phosphorus in Major U.S. Rivers, 1966-1977

River	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
Alabama												
(26 stations) (1)												
Concentration (2)							.12	.10		.06	.05	.07
% in Violation (3)							48	32		8	4	10
No. of Observations	(a)	(a)	(a)	(a)	(b)	(b)	21	28	(b)	24	24	20
Columbia												
(6 stations) (1)												
Concentration (2)									.06	.05	.08	.04
% in Violation (3)									13	2	2	0
No. of Observations	(a)	(a)	(a)	(a)	(b)	(b)	(a)	(b)	40	60	55	36
Delaware												
(38 stations) (1)												
Concentration (2)						.22	.11		.07	.07	.08	.06
% in Violation (3)						38	30		15	20	20	16
No. of Observations	(a)	(a)	(a)	(b)	(b)	26	23	(b)	39	40	55	37
Hudson												
(15 stations) (1)												
Concentration (2)						.11	.08	.08	.06	.06	.06	.07
% in Violation (3)						45	27	21	11	4	3	11
No. of Observations	(a)	(a)	(a)	(a)	(b)	67	52	66	73	50	23	66
Mississippi												
(64 stations) (1)												
Concentration (2)	.19	.19	.20	.16	.18	.21	.24	.28	.26	.28	.25	.24
% in Violation (3)	70	57	58	54	65	69	80	85	79	84	81	82
No. of Observations	20	63	112	103	130	177	270	352	423	571	535	303
Missouri												
(25 stations) (1)												
Concentration (2)	.14	.11	.08	.22	.25	.25	.19	.29	.19	.17	.11	.21
% in Violation (3)	48	39	18	60	78	60	49	53	50	37	33	37
No. of Observations	29	33	33	35	58	63	63	68	200	213	169	172
Ohio												
(34 stations) (1)												
Concentration (2)	.11	.16	.16	.20	.20	.20	.21	.19	.15	.13	.10	.14
% in Violation (3)	30	38	55	82	78	86	66	74	56	52	33	46
No. of Observations	33	48	80	97	100	95	62	97	81	93	60	41
Potomac												
(75 stations) (1)												
Concentration (2)												
% in Violation (3)												
No. of Observations	(b)	(b)	(b)	(b)	(b)	(a)	(b)	(b)	(b)	(a)	(a)	(a)
Red												
(15 stations) (1)												
Concentration (2)									.22	.15	.21	.24
% in Violation (3)									81	59	57	62
No. of Observations	(a)	(a)	(a)	(b)	(b)	(b)	(b)	(b)	78	129	153	133

11-3 Phosphorus in Major U.S. Rivers, 1966-1977 (cont.)

River	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
Rio Grande												
(16 stations) (1)												
Concentration (2)				.19	.09	.20	.72	.72	.40	.35	.23	.22
% in Violation (3)				61	18	50	92	89	74	74	60	53
No. of Observations	(b)	(b)	(b)	28	65	44	79	66	86	178	88	70
Susquehanna												
(16 stations) (1)												
Concentration (2)									.10	.08	.10	.10
% in Violation (3)									31	15	25	24
No. of Observations	(b)	(b)	(b)	(b)	(b)	(b)	(b)	(b)	94	68	51	42
Tennessee												
(61 stations) (1)												
Concentration (2)	.10	.08	.09	.04	.06	.06	.07	.07	.07	.06	.04	.04
% in Violation (3)	18	10	16	2	6	6	8	17	12	9	4	4
No. of Observations	34	71	99	61	36	64	97	262	669	696	790	488
Willamette												
(20 stations) (1)												
Concentration (2)												.10
% in Violation (3)												50
No. of Observations	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	64

All stations with time-series data were analyzed. Values higher than 2.5 micrograms per liter were excluded. (They may have been poor samples, incorrectly reported, or keypunch errors.) All stations did not operate continuously during this period. Note that some stations took more observations per year than others. Therefore, the data may be biased toward conditions at those stations which monitored phosphorus more frequently.

These rivers were picked according to trend data available from 22 waterways analyzed by the U.S. Environmental Protection Agency. The 22 rivers and bays included those meeting three criteria: ten longest rivers (in miles), ten rivers with the highest flow (in cubic feet per second), and the water bodies of the ten largest urban areas.

(1) Number of stations monitoring any water quality parameter. All of these stations did not necessarily monitor phosphorus.

(2) Average annual concentration of total phosphorus in milligrams per liter.

(3) Percent of observations below a "violation" of 0.1 milligrams per liter. This level is the "desired goal for the prevention of plant nusiances in streams or other flowing waters not discharging directly to lakes or impoundments." (U.S. Environmental Protection Agency, Quality Criteria for Water, 1976, p. 188.) It is not a legal limit.

(a) Not measured or not reported to STORET.

(b) Measured infrequently (less than 20 observations per year).

Source: Council on Environmental Quality, UPGRADE analysis of the U.S. Environmental Protection Agency's STORET data system, unpublished data.

11-4 Nitrates in Major U.S. Rivers, 1966-1977

River	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
Alabama (26 stations) (1)												
Concentration (2)									.49	.19	.36	
No. of Observations	(a)	(a)	(a)	(b)	(b)	(a)	(b)	(b)	61	69	51	(b)
Columbia (6 stations) (1)												
Concentration (2)											.08	
No. of Observations	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(b)	32	(b)
Delaware (38 stations) (1)												
Concentration (2)	.71	.69	.95	1.26	1.30	.97	1.10	1.11	1.11	1.09	1.08	1.24
No. of Observations	232	621	1,060	737	1,111	1,119	1,086	1,145	52	383	326	344
Hudson (15 stations) (1)												
Concentration (2)	16								.55	.74		
No. of Observations	46	(a)	(b)	(a)	(a)	(a)	(b)	(b)	71	32	(a)	(b)
Mississippi (64 stations) (1)												
Concentration (2)	.48	.54	40	.58	.79	.52	1.11	1.23	1.09	.90	.74	1.19
No. of Observations	41	65	95	138	115	94	109	178	218	268	152	39
Missouri (25 stations) (1)												
Concentration (2)				.60	.50	.57	.84	1.14	.77	.90		.24
No. of Observations	(a)	(a)	(a)	37	52	64	47	51	44	27	(b)	30
Ohio (34 stations) (1)												
Concentration (2)		.81	.87	1.05	.96	1.01	1.10	2.57	1.27		1.49	1.13
No. of Observations	(a)	29	52	41	45	68	66	75	52	(b)	25	23
Potomac (75 stations) (1)												
Concentration (2)			.58	.50	.73	.64	.82	.99	.73	1.04	.76	
No. of Observations	(a)	(b)	23	585	757	500	685	823	480	359	42	(b)
Red (15 stations) (1)												
Concentration (2)				.57	.67	.77	.63	.59	.21	.16	.17	.12
No. of Observations	(a)	(a)	(a)	34	180	172	124	46	71	118	81	72
Rio Grande (16 stations) (1)												
Concentration (2)						.45	.58	.50	.38	.38	.43	.37
No. of Observations	(a)	(a)	(b)	(b)	(b)	30	23	44	56	146	71	73

11-4 Nitrates in Major U.S. Rivers, 1966-1977 (cont.)

River	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
Susquehanna (16 stations) (1)												
Concentration (2)							1.03		1.35			
No. of Observations	(a)	(a)	(a)	(a)	(b)	(b)	26	(b)	22	(b)	(b)	(a)
Tennessee (61 stations) (1)												
Concentration (2)	.17	.34	.37	.37	.31	.48	.33	.38	.47		.40	
No. of Observations	34	64	73	60	36	60	80	89	23	(b)	20	(a)
Willamette (20 stations) (1)												
Concentration (2)	.17	.09	.35	.37	.26	.23	.30	.33	.25	.24		
No. of Observations	61	62	60	67	78	88	90	110	100	97	(b)	(a)

All stations with time-series data were analyzed. Values higher than 10 milligrams per liter were excluded. (They may have been poor samples, incorrectly reported, or keypunch errors.) All of these stations did not operate continuously during this period. Note that some stations took more observations per year than others. Therefore, the data may be biased toward conditions at those stations which monitored nitrates more frequently.

These rivers were picked according to trend data available from 22 waterways analyzed by the U.S. Environmental Protection Agency. The 22 rivers and bays included those meeting three criteria: ten longest rivers (in miles), ten rivers with the highest flow (in cubic feet per second), and the water bodies of the ten largest urban areas.

(1) Number of stations monitoring any water quality parameter. All of these stations did not necessarily monitor nitrates.

(2) Average annual concentration of total nitrate nitrogen as N in milligrams per liter.

(a) Not measured or not reported to STORET.

(b) Measured infrequently (less than 20 observations per year).

Source: Council on Environmental Quality, UPGRADE analysis of the U.S. Environmental Protection Agency's STORET data system, unpublished data.

11-5 Turbidity in Major U.S. Rivers, 1966-1977

River	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
Alabama (26 stations) (1)												
Concentration (2)								28.75	21.57	22.76	30.77	19.10
No. of Observations	(a)	(a)	(a)	(b)	(b)	(b)	(b)	20	79	94	79	24
Columbia (6 stations) (1)												
Concentration (2)										4.24	6.09	2.36
No. of Observations	(a)	(b)	(b)	(b)	(b)	(a)	(a)	(b)	(b)	34	43	25
Delaware (38 stations) (1)												
Concentration (2)	13.05	15.43	14.34	11.56	7.17	9.41	10.34	9.77	5.94	6.79	4.40	8.67
No. of Observations	237	439	465	71	493	758	791	792	850	52	75	63
Hudson (15 stations) (1)												
Concentration (2)	8.68				8.05		27.78	28.05	10.95	11.7	10.79	
No. of Observations	42	(a)	(b)	(a)	24	(b)	24	26	40	50	24	(b)
Mississippi (64 stations) (1)												
Concentration (2)	106.46	122.37	100.35	131.55	108.13	95.92	62.7	75.85	43.19	63.14	50.23	50.16
No. of Observations	206	244	254	227	261	266	168	205	182	313	265	182
Missouri (25 stations) (1)												
Concentration (2)	76.33	79.11	67.59	98.53	84.73	107.03	139.16	141.67	39.38	33.71	35.94	30.81
No. of Observations	175	196	159	102	158	67	31	33	143	165	162	137
Ohio (34 stations) (1)												
Concentration (2)	64.24	62.76	49.61	42.63	38.04	35.82	49.53	32.19	30.78	37.19	32.87	30.41
No. of Observations	195	226	235	222	309	215	172	164	110	145	63	56
Potomac (75 stations) (1)												
Concentration (2)	45.42	32.58	24.22	23.79	32.07	42.33	39.45	32.10	25.76	29.07	7.45	
No. of Observations	287	287	397	808	911	938	1,235	611	597	534	18	(a)
Red (15 stations) (1)												
Concentration (2)	107.37	157.86	203.12	150.97	147.63	64.61	59.24	137.68	95.10	62.87	55.17	56.98
No. of Observations	30	28	32	31	27	44	49	53	87	161	179	146
Rio Grande (16 stations) (1)												
Concentration (2)	198.23	182.97	216.00	194.51	163.71	112.97	81.94	162.94	113.12	113.20	61.99	52.85
No. of Observations	30	32	42	45	59	66	164	256	95	126	62	53

11-5 Turbidity in Major U.S. Rivers, 1966-1977 (cont.)

River	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
Susquehanna (16 stations) (1)												
Concentration (2)	31.84	27.43	30.97	19.33	14.71	17.62	19.88	18.93	17.25	15.42	12.42	18.52
No. of Observations	55	53	36	36	54	60	60	58	83	60	50	44
Tennessee (61 stations) (1)												
Concentration (2)	10.12	9.18	16.53		13.75	9.28	10.63	13.61	10.64	11.02	7.93	11.17
No. of Observations	33	65	100	(b)	36	64	103	302	683	687	675	364
Willamette (20 stations) (1)												
Concentration (2)	17.39	11.11	17.43	9.58	13.77	15.35	11.68	8.82	16.33	6.01	5.36	
No. of Observations	56	62	60	67	78	88	90	97	100	96	47	(a)

All stations with time-series data were analyzed. Values higher than 500 Jackson turbidity units were excluded. (They may have been poor samples, incorrectly reported, or keypunch errors.) All of these stations did not operate continuously during this period. Note that some stations took more observations per year than others. Therefore, the data may be biased toward conditions at those stations which monitored turbidity more frequently.

These rivers were picked according to trend data available from 22 waterways analyzed by the U.S. Environmental Protection Agency. The 22 rivers and bays included those meeting three criteria: ten longest rivers (in miles), ten rivers with the highest flow (in cubic feet per second), and the water bodies of the ten largest urban areas.

(1) Number of stations monitoring any water quality parameter. All of these stations did not necessarily monitor turbidity.

(2) Average annual concentration of turbidity in Jackson turbidity units. This unit measures the penetration of light through a sample. A low number signifies clear water and a high number signifies muddy water.

(a) Not measured or not reported to STORET.

(b) Measured infrequently (less than 20 observations per year).

Source: Council on Environmental Quality, UPGRADE analysis of the U.S. Environmental Protection Agency's STORET data system, unpublished data.

11-6 Pesticide Residues in River Water and Sediments in Texas, Louisiana, and Oklahoma, 1968-1976 (in percentage of samples with measurable amounts)

Pesticide Compound	1968		1969		1970		1971		1972		1973		1974		1975		1976	
	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
Insecticides																		
Organochlorines																		
DDT	36	-	38	-	37	89	27	100	21	77	17	36	6	40	5	33	4	27
DDD	19	-	31	-	31	93	12	100	6	81	3	38	4	50	5	47	3	39
DDE	22	-	14	-	17	96	9	100	7	87	9	36	4	56	4	51	6	50
Aldrin	1	-	0	-	2	81	0	100	0	66	1	1	3	2	0	2	0	2
Dieldrin	14	-	37	-	31	87	47	100	44	75	28	31	29	43	22	49	21	36
Chlordane	-	-	64	-	28	100	35	100	29	74	12	27	16	36	9	43	15	36
Heptachlor	0	-	1	-	0	82	0	100	0	65	0	0	1	1	2	3	3	0
Endrin	0	-	0	-	0	80	0	100	0	65	0	0	0	0	0	1	0	1
Organophosphates																		
Malathion	-	-	-	-	14	-	8	-	4	-	2	-	6	-	9	-	14	-
Parathion	-	-	-	-	1	-	1	-	0	-	1	-	0	-	0	-	0	-
Methyl Parathion	-	-	-	-	12	-	2	-	1	-	1	-	0	-	1	-	1	-
Diazinon	-	-	-	-	25	-	43	-	50	-	54	-	46	-	45	-	44	-
Herbicides																		
Phenoxys																		
2-4,D	34	-	33	-	33	-	18	-	28	-	56	-	38	-	36	-	29	-
2-4-5,T	44	-	66	-	61	-	44	-	46	-	45	-	35	-	31	-	31	-
Silvex	8	-	6	-	10	-	11	-	7	-	7	-	14	-	9	-	11	-

W = Water.

S = Sediment.

Data collected from 60 stream monitoring sites in Texas, Louisiana, and Oklahoma, and measured as annual composite detection rates.

Sources: UPGRADE analysis based on U.S. Geological Survey data. Council on Environmental Quality, Environmental Quality - 1977, 1978, p. 242.

11-7 Phenols in the Upper Ohio River Basin, 1968-1976
(in percentage of all measurements exceeding a criterion) (1)

Year	Exceeding 1.0 ug/l (2)	Exceeding 5.0 ug/l (2)
1968	78	43
1969	72	35
1970	73	37
1971	67	38
1972	75	23
1973	82	27
1974	53	8
1975	46	14
1976	44	19

The Upper Ohio River includes the first 300 miles.

(1) States bordering the Ohio River have different criteria for phenols. Ohio has a criterion level of 1.0 micrograms per liter, which coincides with the Environmental Protection Agency's national criterion. West Virginia and Pennsylvania, however, each have a criterion of 5.0 micrograms per liter.

(2) ug/l = micrograms per liter.

Source: UPGRADE analysis based on data from the U.S. Environmental Protection Agency's STORET system (14 sites) for 1968-1975 and the Ohio River Sanitation Commission (10 stations) for 1976. Council on Environmental Quality, Environmental Quality - 1977, 1978, p. 248.

11-8 Point Discharges Reportedly Affecting the Water Quality of U.S. Water Drainage Basins, 1977

EPA Hydrologic Region (1)	Number of Basins	Point Source (percentage of drainage basins)		
		Industrial	Municipal	Combined Sewer Overflows
Total, U.S.	246	72	89	21
Northeast (2)	40	95	95	60
Southeast (3)	47	74	91	17
Great Lakes (4)	41	80	95	37
North Central (5)	35	74	86	6
South Central (6)	30	70	100	0
Southwest (7)	22	23	64	0
Northwest (8)	22	55	73	14
Islands (9)	9	89	100	0

Areas affected may include all or part of a basin.

(1) Each EPA hydrologic region contains two or more major water basins. (The eight EPA regions are not equivalent to the twenty-one Water Resource Regions used by the Water Resources Council and the U.S. Geological Survey.)

(2) Northeast and North Atlantic basins.

(3) Southeast and Tennessee River basins.

(4) Great Lakes and Ohio River basins.

(5) Upper Mississippi, Missouri, and Hudson Bay basins.

(6) Lower Mississippi and Western Gulf basins.

(7) Colorado River, Central and Southern California, and Great Basins.

(8) Pacific Northwest, Northern California, and Alaska Basins.

(9) Hawaii, Puerto Rico, Virgin Islands, Guam, Trust Territory of the Pacific Islands, and American Samoa.

Source: U.S. Environmental Protection Agency, National Water Quality Inventory, 1977 Report to Congress, January 1979, p. 11.

11-9 Pollutants Discharged by Industry, 1973
(in millions of pounds)

Industry	Biochemical Oxygen Demand	Suspended Solids
All Industry, total	4,500.0	723,000.0
In-depth Industry, total (1)	3,600.0	12,000.0
Pulp and paper	1,898.5	2,234.3
Organic chemicals	1,232.9	N.A.
Petroleum refining	113.6	29.1
Iron and steel	39.3	2,549.3
Inorganic chemicals	5.0	1,145.2
Plastics and synthetics	202.6	108.6
Textile mills	126.2	109.8
Steam/electric power	N.A.	5,877.0
General Industry, total	900.0	711,000.0
Mining, total	10.7	710,021.9
Ore mining and dressing	0.0	688,863.7
Coal mining	0.0	40.4
Petroleum and gas extraction	10.7	15.7
Mineral mining and processing	0.0	21,104.4
Other Industry, total	886.5	705.9
Meat products and rendering	30.3	8.0
Dairy products	41.1	16.7
Grain mills	19.1	5.0
Cane sugar processing	11.1	83.7
Beet sugar processing	9.2	48.7
Seafood	24.5	19.5
Builders' paper	19.2	65.3
Fertilizer	0.0	0.0
Paving and roofing	0.0	2.8
Rubber	22.1	70.1
Leather tanning	40.5	43.0
Glass	0.6	2.6
Cement	103.7	18.8
Pottery	0.0	30.5
Concrete, gypsum	0.0	1.3
Asbestos	0.0	5.3
Ferroalloy	0.0	1.0
Nonferrous metals	0.0	8.7
Electroplating	0.3	1.6
Fruits and vegetables	275.2	122.7
Miscellaneous chemicals	289.7	150.5

11-9 Pollutants Discharged by Industry, 1973 (cont.)
(in millions of pounds)

N.A. - Not Available.

Details do not add to totals due to rounding.

Data are revised from the National Residuals Discharge Inventory which measured biochemical oxygen demand and suspended solids from point (industrial, municipal, and mining) and nonpoint (urban and agricultural) sources. Estimates for industrial sources may be low since data were not available for all industries. Estimates include residuals discharged after applying in-place control technologies.

(1) These eight industries use about 74 percent of all water withdrawn for industrial purposes.

Source: Luken, Ralph A., and Pechan, Edward H., Water Pollution Control: Assessing the Impacts and Costs of Environmental Standards, Praeger Publishers, 1977, pp. 30, 31.

11-10 Industries in Compliance with Federal Water Pollution Regulations, 1977

SIC Code(1)	Industrial Category	Plants in Compliance	Plants Not in Compliance	Plants in Industry, Total	Percent Plants in Compliance
3400	Fabricated Metal Products	248	18	266	93
2600	Paper Products	161	18	179	90
3200	Stone and Concrete	89	15	104	86
2000	Food Products	375	62	437	86
2200	Textiles	164	28	192	85
2800	Chemical Products	480	83	563	85
2911	Petroleum Refining	125	25	150	83
1000-1400	Mining	67	14	81	83
2821	Plastic Materials	66	14	80	82
3300	Primary Metal Industries	147	40	187	79
2611,2621	Pulp and Paper Mills	175	51	226	77
4911	Electric Power Plants	293	150	443	66
3312	Steel Plants (Blast Furnaces)	51	44	95	54

Compliance here means that industries report effluent levels to EPA each quarter. It does not necessarily imply that they have reduced their effluents to the limit required by their permit.

Data compiled June 9, 1977 from the Permit Compliance System (PCS) Source Inventory and the Quarterly Noncompliance Report.

(1) Standard Industrial Classification Code.

Source: U.S. Environmental Protection Agency, Office of Water Enforcement, "Summary Statistics on Anticipated Violations of the July 1, 1977 Statutory Deadline," Table 4.

11-11 Sewered Population, 1940-1973
(in millions of people, except where noted)

Year	U.S. Population	Not Sewered		Sewered											
				Sewered, Total		Not Treated		Treated		Degree of Treatment					
										Primary (1)		Secondary		Tertiary	
		Pop.	% of Total Pop.	Pop.	% of Total Pop.	Pop.	% of Total Pop.	Pop.	% of Total Pop.	Pop.	% of Total Pop.	Pop.	% of Total Pop.	Pop.	% of Total Pop.
1940	133	66	50	67	50	30	23	37	28	18	14	19	14	0.0	0.0
1945	140	70	50	70	50	28	20	42	30	21	15	22	16	0.0	0.0
1948	145	72	50	73	50	28	19	45	31	22	15	23	16	0.0	0.0
1957	171	73	43	98	57	24	14	74	43	31	18	43	25	0.0	0.0
1962	186	68	37	118	63	15	8	103	55	42	23	62	33	0.0	0.0
1968	198	58	29	140	71	10	5	130	66	44	22	86	43	0.3	<0.5
1973	210	47	22	166	79	3.2	1.5	162	77	55	26	105	50	2.7	1.3

Details may not add to totals due to rounding.

(1) Includes intermediate treatment.

Sources: 1940-1957: U.S. Environmental Protection Agency, Economics of Clean Water - 1973, 1973, pp. 19, 20.
1962-1973: U.S. Environmental Protection Agency, National Water Quality Inventory - 1974 Report to Congress, EPA 440/9-74-001, Volume 1, p. 268.

11-12 Nonpoint Discharges Reportedly Affecting the Water Quality of U.S. Water Drainage Basins, 1977

EPA Hydrologic Region (1)	Number of Basins	Nonpoint Source (percentage of drainage basins)							
		Agriculture	Urban Runoff	Individual Disposal	Mining	Silviculture	Hydrologic Modification	Construction	Solid Waste Disposal
Total, U.S.	246	68	52	43	30	15	15	9	14
Northeast (2)	40	55	70	63	20	10	20	15	35
Southeast (3)	47	62	57	40	15	30	21	2	9
Great Lakes (4)	41	59	54	39	41	15	2	7	15
North Central(5)	35	86	54	29	40	6	3	6	9
South Central(6)	30	87	53	40	53	13	23	0	13
Southwest (7)	22	73	23	35	36	5	18	0	0
Northwest (8)	22	55	23	32	23	27	23	23	9
Islands (9)	9	78	67	89	0	0	22	67	22

Areas affected may include part or all of a basin.

(1) Each EPA hydrologic region contains two or more major water basins. (The eight EPA regions are not equivalent to the twenty-one Water Resource Regions used by the Water Resources Council and the U.S. Geological Survey.)

(2) Northeast and North Atlantic basins.

(3) Southeast and Tennessee River basins.

(4) Great Lakes and Ohio River basins.

(5) Upper Mississippi, Missouri, and Hudson Bay basins.

(6) Lower Mississippi and Western Gulf basins.

(7) Colorado River, Central and Southern California, and Great Basins.

(8) Pacific Northwest, Northern California, and Alaska Basins.

(9) Hawaii, Puerto Rico, Virgin Islands, Guam, Trust Territory of the Pacific Islands, and American Samoa.

Source: U.S. Environmental Protection Agency, National Water Quality Inventory, 1977 Report to Congress, January 1979, p. 15.

11-13 Ocean Dumping of U.S. Waste by Barge, 1951-1977
(in thousands of tons)

Type of Waste	1951 (1)	1956 (1)	1961 (1)	1966 (1)	1968	1973	1974	1975	1976	1977
Sewage Sludge, Industrial Waste, and Other, Total	1,705	3,426	5,814	7,422	9,783	10,934	10,388	8,888	8,328	7,402
Sewage Sludge	N.A.	N.A.	N.A.	N.A.	4,477	4,899	5,010	5,040	5,271	5,134
Industrial Waste	N.A.	N.A.	N.A.	N.A.	4,691	5,051	4,580	3,442	2,734	1,844
Construction and Demolition Debris	N.A.	N.A.	N.A.	N.A.	574	974	770	396	315	379
Incinerated Chemicals	N.A.	N.A.	N.A.	N.A.	N.A.	0	12.3	4.1	0	29.7
Incinerated Wood	N.A.	N.A.	N.A.	N.A.	N.A.	10.8	15.8	6.2	8.7	15.1
Solid Waste	N.A.	N.A.	N.A.	N.A.	26	0.2	0.2	0	0	0.1
Explosives	N.A.	N.A.	N.A.	N.A.	15	0	0	0	0	0
Dredged Material (2)	N.A.	N.A.	N.A.	N.A.	38,428	79,800	118,400	105,400	78,600	N.A.
All Wastes, Total	N.A.	N.A.	N.A.	N.A.	48,200	90,700	128,800	114,300	86,900	N.A.

N.A. - Not Available.

Data for 1951-1968 may not be strictly comparable to data for 1973-1977.

Totals include Atlantic, Pacific, and Gulf coasts. Details may not add to totals due to rounding.

(1) Data are averages for five-year periods (1949-1953, 1954-1958, 1959-1963, and 1964-1968). Radioactive wastes and military explosives are not included.

(2) The amount of dredged material dumped in coastal waters fluctuates from year to year since the need to dredge is heavily influenced by natural events such as floods and siltation.

Sources:
1951-1968: Council on Environmental Quality, Ocean Dumping: A National Policy, 1970, pp. 3, 8.
1973-1976: (Dredged Material): U.S. Department of Commerce, National Oceanographic and Atmospheric Administration, Report to the Congress on Ocean Dumping Research, 1977, p. 3.
1973-1977: (Sewage Sludge, Industrial Waste, and Other): U.S. Environmental Protection Agency, Ocean Dumping in the United States - 1978, 1978, p. 21.

11-14 Oil Spills in U. S. Waters, 1972-1976

Year	Total Spills		Large Spills (>100,000 gallons)		Small Spills (<100,000 gallons)	
	Volume (thousand gallons)	Incidents	Volume (thousand gallons)	Incidents	Volume (thousand gallons)	Incidents
1972	18,806	9,931	15,388	19	3,418	9,912
1973	15,393	11,025	10,170	28	5,223	10,997
1974	16,171	11,683	8,955	30	7,216	11,653
1975	20,442	10,146	16,109	20	4,334	10,126
1976	30,042	10,576	25,315	23	4,728	10,553

Sources of spills include vessels, marine facilities, and pipelines within 200 miles of the U.S. coast and onshore bulk storage and refineries.

Details may not add to totals due to rounding.

Data are compiled from the U.S. Coast Guard's Pollution Incident Reporting System (PIRS) and the U.S. Environmental Protection Agency's Spill Prevention, Control and Countermeasure file (SPCC).

Sources: Council on Environmental Quality, Environmental Quality - 1977, p. 229, GKY and Associates, Inc., Analysis of Oil Spill Trends, prepared for the Council on Environmental Quality and the U.S. Environmental Protection Agency, 1976, p. 22.

12

AIR QUALITY

12-1 Pollutant Standards Index (PSI) (1), Selected Cities, 1973-1976

Air Quality Control Region (AQCR)	AQCR No.	1973 Days of Year in PSI Intervals (2)				1974 Days of Year in PSI Intervals (2)				1975 Days of Year in PSI Intervals (2)				1976 Days of Year in PSI Intervals (2)			
		0-100	100-200	200-300	>300	0-100	100-200	200-300	>300	0-100	100-200	200-300	>300	0-100	100-200	200-300	>300
Boston, Mass. Pollutant (3)	119	155	190 CO (132)	20 CO (16)	0	165	183 CO (116)	17 CO (16)	0	227	135 CO (68)	3 CO (2)	0	211	140 OZ (77)	13 CO (8)	2
Chicago, Ill. Pollutant (3)	67	132	193 CO (154)	38 CO (21)	2 TSP (2)	107	228 CO (183)	23 TSP (9)	7 TSP (5)	138	152 CO (97)	61 CO (79)	14 TSP (11)	249	112 OZ (75)	5 OZ (5)	0
Cincinnati, Ohio Pollutant (3)	79	279	85 OZ (73)	1 TSP (1)	0	324	40 OZ (27)	1 TSP (1)	0	270	90 OZ (86)	4 OZ(2) TSP (2)	1 TSP (1)	239	123 OZ (111)	4 TSP (3)	0
Dayton, Ohio Pollutant (3)	173	328	47 OZ (29)	3 CO (1)	0	285	79 OZ (77)	1 TSP (1)	0	297	63 CO (37)	5 CO (3)	0	221	143 OZ (130)	2 CO(1) OZ(1)	0
Denver, Colo. Pollutant (3)	36	163	147 CO (80)	51 CO (29)	4 CO (3)	123	194 OZ (117)	45 CO (27)	3 TSP (2)	152	176 OZ (94)	35 CO (31)	2 CO (1) TSP (1)	136	198 CO (121)	32 CO (29)	0
Fresno, Calif. Pollutant (3)	31	165	196 OZ (180)	4 OZ(2) TSP (2)	0	152	192 OZ (178)	21 OZ (17)	0	157	200 OZ (164)	7 TSP (4)	1 TSP (1)	197	165 OZ (131)	4 TSP (2)	0
Kansas City, Mo. Pollutant (3)	94	329	29 CO (11)	7 TSP (6)	0	351	13 OZ (5)	1 TSP (1)	0	348	17 OZ (12)	0	0	327	33 OZ (29)	3 OZ (3)	3 OZ (3)
Louisville, Ky. Pollutant (3)	78	263	88 CO (57)	14 CO (9)	0	234	104 CO (74)	27 CO (23)	0	148	186 CO (134)	31 CO (29)	0	153	199 CO (111)	14 CO (12)	0
Los Angeles, Cal. Pollutant (3)	24	42	139 OZ (71)	169 OZ (113)	15 OZ (13)	24	118 OZ (79)	184 OZ (109)	39 OZ (38)	49	136 OZ (83)	175 OZ (116)	5 OZ (3)	45	156 OZ (115)	165 OZ (98)	0
Miami, Fla. Pollutant (3)	50	319	46 OZ (40)	0	0	328	37 OZ (24)	0	0	303	62 OZ (57)	0	0	327	39 OZ (35)	0	0

12-1 Pollutant Standards Index (PSI) (1), Selected Cities, 1973-1976 (cont.)

Air Quality Control Region (AQCR)	AQCR No.	1973 Days of Year in PSI Intervals (2)				1974 Days of Year in PSI Intervals (2)				1975 Days of Year in PSI Intervals (2)				1976 Days of Year in PSI Intervals (2)			
		0-100	100-200	200-300	>300	0-100	100-200	200-300	>300	0-100	100-200	200-300	>300	0-100	100-200	200-300	>300
Portland, Ore. Pollutant (3)	193	132	184 CO (176)	49 CO (49)	0	207	145 CO (110)	13 CO (12)	0	267	85 CO (64)	13 CO (12)	0	278	86 CO (73)	2 CO(1) OZ(1)	0
Sacramento, Cal. Pollutant (3)	28	197	166 OZ (164)	2 OZ (2)	0	193	170 OZ (163)	2 CO (2)	0	249	115 OZ (102)	1 OZ (1)	0	268	95 OZ (67)	3 CO (3)	0
Salt Lake City, Ut. Pollutant (3)	220	256	97 CO (63)	12 CO (9)	0	247	94 CO (54)	20 CO (10)	4 TSP (4)	209	130 OZ (79)	21 CO (12)	5 TSP (3)	198	139 CO (58)	24 SO2 (12)	5 SO2 (3)
San Francisco, Cal. Pollutant (3)	30	227	127 OZ (96)	11 OZ (8)	0	183	167 OZ (136)	14 OZ (11)	1 TSP (1)	223	138 OZ (109)	4 CO(2) OZ(2)	0	203	135 OZ (85)	28 CO (28)	0
Seattle, Wash. Pollutant (3)	229	137	171 CO (168)	57 CO (57)	0	237	116 CO (102)	12 CO (12)	0	279	81 CO (66)	5 CO (5)	0	273	88 CO (84)	5 CO (5)	0
Washington, D.C. Pollutant (3)	47	171	176 OZ (111)	15 CO (7)	3 OZ (2)	226	115 OZ (77)	15 CO (8)	9 TSP (9)	185	152 OZ (106)	27 CO (9)	1 CO (1)	194	156 OZ (109)	16 OZ (6)	0
Total, 16 cities(4)		3295	2098	423	24	3386	2061	330	63	3501	1957	353	29	3522	2016	311	7
Average, 16 cities (5)		205.9	131.1	26.4	1.5	211.6	128.8	20.6	3.9	218.8	122.3	22.1	1.8	220.1	126.0	19.4	0.4

CO - Carbon Monoxide. TSP - Total Suspended Particulates. SO2 - Sulfur Dioxide. OZ - Ozone.

(1) PSI is a highly summarized health-related index based on direct measurements of five criteria pollutants: carbon monoxide (CO), sulfur dioxide (SO2), total suspended particulates (TSP), photochemical oxidants or ozone (OZ), and nitrogen dioxide (NO2). The PSI for one day will rise above 100 when any one of the five criteria pollutants (at any one station in an SMSA) reaches a level judged to have adverse short-term effects on human health.

PSI is designed for the daily reporting of air quality to advise the public of potentially acute, but not chronic, health effects. PSI should not be used to rank cities. To properly rank the air pollution problems in different cities, one should rely not just on air quality data but should also include all data on population characteristics, daily population mobility, transportation patterns, industrial composition, emission inventories, meteorological factors, and the spatial representativeness of air monitoring sites.

12-1 Pollutant Standards Index (PSI) (1), Selected Cities, 1973-1976 (cont.)

(2) 0-100 signifies good or moderate air quality.
100-200 signifies unhealthful air quality.
200-300 signifies very unhealthful air quality.
> 300 signifies hazardous air quality.

(3) Pollutant driving the index for (x) days in PSI interval.

(4) 1973-1975: The total number of days for each year is 5,840 (365 for each of the 16 cities).
1976: The total number of days is 5,856 (366 for each of the 16 cities).

(5) Note that the average PSI values do not represent an average city, but an average of 16 cities. Cities were chosen according to availability of trend data.

Source: Council on Environmental Quality, Environmental Quality - 1978, pp. 5-13, based on Council on Environmental Quality analysis of U.S. Environmental Protection Agency's SAROAD data system.

12-2 Ambient Carbon Monoxide (CO) Levels in 13 Cities (1), 1973-1976

Days in CO Concentration	1973	1974	1975	1976
Total number of days of possible monitoring	5,475	5,475	5,475	5,490
Total number of days above the standard of 10 milligrams per cubic meter (2)	896	768	616	576
Percent of total days	16.4	14.0	11.3	10.5
Number of days at 10-16 milligrams per cubic meter	737	661	522	522
Percent of total days	13.5	12.1	9.5	9.5
Number of days at 16-22 milligrams per cubic meter	137	89	86	54
Percent of total days	2.5	1.6	1.6	0.9
Number of days at >22 milligrams per cubic meter	22	18	8	-
Percent of total days	0.4	0.3	0.2	-

(1) Cities include Los Angeles, California (2 sites); Portland, Oregon (2 sites); and one site each in Springfield, Massachusetts; Reno, Nevada; Medford, Massachusetts; Ogden, Utah; Fairbanks, Alaska; Seattle, Washington; Shively, Kentucky; Bakersfield, California; Wichita, Kansas; Denver, Colorado; and Santa Barbara, California. These cities were chosen according to availability of trend data.

(2) The National Ambient Air Quality Standard (NAAQS) for CO is 10.0 milligrams per cubic meter.

Source: Council on Environmental Quality, Environmental Quality - 1978, pp. 20, 21.

12-3 Ambient Oxidant (Ox) Levels in 12 Cities (1), 1973-1976

Days in Ox Concentration	1973	1974	1975	1976
Total number of days of possible monitoring	5,475	5,475	5,475	5,490
Total number of days above the standard 160 micrograms per cubic meter (.08 ppm) (2)	790	834	688	629
Percent of total days	14.4	15.2	12.6	11.5
Number of days at 160-300 micrograms per cubic meter (.08-.15 ppm)	676	714	580	524
Percent of total days	12.3	13.0	10.6	9.5
Number of days at 300-400 micrograms per cubic meter (.15-.20 ppm)	82	98	71	75
Percent of total days	1.5	1.8	1.3	1.4
Number of days at >400 micrograms per cubic meter (.20 ppm)	32	22	37	30
Percent of total days	0.6	0.4	0.7	0.5

(1) Cities include Los Angeles, California (2 sites); San Francisco, California (2 sites); Monterey, California (2 sites); and one site each in Fort Lauderdale, Florida; Tampa, Florida; Sacramento, California; Chico, California; Ogden, Utah; Newport, Kentucky; Youngstown, Ohio; Dayton, Ohio; and Medford, Massachusetts. These cities were chosen according to availability of trend data.

(2) The National Ambient Air Quality Standard (NAAQS) for Ox was changed in January 1979 from 160 micrograms per cubic meter (0.08 ppm) to 240 micrograms per cubic meter (0.12 ppm). This analysis is based on the earlier standard.

Source: Council on Environmental Quality, Environmental Quality - 1978, pp. 24, 25.

12-4 National Ambient Sulfur Dioxide (SO2) and Total Suspended Particulate (TSP) Concentrations, 1970-1977
(in micrograms per cubic meter)

Year	Sulfur Dioxide (1)		Total Suspended Particulates (2)	
	722 Monitoring Stations	1,233 Monitoring Stations	2,350 Monitoring Stations	2,707 Monitoring Stations
1970	27.4	N.A.	70.4	N.A.
1971	25.7	N.A.	69.6	N.A.
1972	24.4	23.0	67.1	66.1
1973	21.9	21.4	65.4	65.0
1974	21.1	20.7	62.5	62.4
1975	20.5	20.4	60.8	60.1
1976	19.9	19.7	61.8	61.2
1977	N.A.	19.4	N.A.	61.0

N.A. - Not Available.

(1) The annual primary National Ambient Air Quality Standard (NAAQS) for Sulphur Dioxide (SO2) is 80 micrograms per cubic meter. Annual composite averages of SO2 were based on daily 24-hour averages.

(2) The National Ambient Air Quality Standard (NAAQS) for Total Suspended Particulates (TSP) is 75 micrograms per cubic meter. Annual composite averages of TSP were based on daily 24-hour averages.

Sources:
1970-1976: U.S. Environmental Protection Agency, National Air Quality and Emissions Trends Report, 1976, published December 1977, pp. 3-3 and 3-10; and U.S. Environmental Protection Agency (EPA), National Aerometric Data Bank (NADB), unpublished data.
1972-1977: U.S. EPA, National Air Quality, Monitoring, and Emissions Trends Report, 1977, published December 1978, pp. 3-2 and 3-8; U.S. Environmental Protection Agency (EPA), National Aerometric Data Bank (NADB), unpublished data.

12-5 Ambient Trace Metal Concentrations (1), 1965-1974
(in micrograms per cubic meter)

Year	Cadmium	Copper	Chromium	Iron	Manganese	Nickel	Lead	Titanium	Vanadium
1965	0.0025	0.10	0.006(a)	1.37	0.040	0.020	0.82	0.021	0.010
1966	0.0020	0.09	0.006(a)	1.19	0.035	0.015	0.85	0.014	0.007
1967	0.0020	0.11	0.006(a)	1.45	0.037	0.015	0.95	0.017	0.007
1968	0.0015	0.09	0.009	1.93	0.033	0.020	0.93	0.031	0.007
1969	0.0050	0.08	0.007	1.64	0.040	0.020	1.10	0.027	0.015
1970	0.0004(a)	0.10	0.005	1.47	0.030	0.015	1.07	0.040	0.008
1971	0.0004(a)	0.09	0.006	1.50	0.032	0.010	1.11	0.027	0.003(a)
1972	0.0004(a)	0.08	0.004	1.14	0.018	0.006	1.04	0.032	0.003(a)
1973	0.0004(a)	0.09	0.005	0.93	0.015	0.007	0.85	0.035	0.003(a)
1974	0.0004(a)	0.10	0.005	0.97	0.015	0.005	0.84	0.034	0.003(a)

(1) Data represent annual average medians from 92 urban high-volume stations in center city business areas. These areas were selected on the basis of trend data availability. Data for the first five-year period are not as precise as the most recent five-year period since the lower discrimination level (LDL) was generally higher in 1965-1969 than 1970-1974.

(a) Median may be less than this concentration. Smaller concentrations could not be detected with available technology.

Source: U.S. Environmental Protection Agency, National Trends in Trace Metals in Ambient Air, 1965-1974, published February 1977, pp. 8, 9; and U.S. Environmental Protection Agency, unpublished data.

12-6 Population Exposed to Oxidants Above the Health Standard in Selected Cities, 1975

SMSA (1)	Population (millions)	Total Number of Person-Days (2) (millions)	Oxidant Concentrations Above 0.10 ppm (3)		Oxidant Concentrations Above 0.15 ppm (3)	
			Number of Person-Days (millions)	Percent of Total Person-Days	Number of Person-Days (millions)	Percent of Total Person-Days
Philadelphia, Pa.	4.8	1,759.3	96.6	5.5	24.8	1.4
St. Louis, Mo.	2.4	861.4	81.2	9.4	23.2	2.7
Washington, D.C.	2.8	1,022.0	48.7	4.8	13.8	1.4
Denver, Colo.	1.2	449.0	14.7	3.3	0.8	0.2
Boston, Mass.	2.8	1,003.8	21.0	2.1	2.3	0.2
Louisville, Ky.	0.8	303.0	9.7	3.2	1.8	0.6
Portland, Ore.	1.0	368.7	3.2	0.9		-
Total, 7 cities	15.9	5,767.2	275.1	4.8	66.7	1.2

These 7 cities were selected according to availability of data.

(1) Standard Metropolitan Statistical Area.

(2) The total number of person-days is equal to the total population of an SMSA multiplied by the number of days in the year.

(3) The current oxidant standard is 0.12 parts per million.

Source: Council on Environmental Quality, Environmental Quality - 1978, p. 61.

12-7 Carbon Monoxide (CO) Emission Estimates, 1970-1976
(in million metric tons/year)

Source	1970	1971	1972	1973	1974	1975	1976
Transportation, Total	79.2	79.6	84.0	81.3	74.0	71.5	69.7
Highway Vehicles	69.7	70.3	74.8	72.0	65.6	63.3	61.4
Non-Highway Vehicles	9.5	9.3	9.2	9.3	8.4	8.2	8.3
Industrial Processes, Total	8.0	7.9	7.9	8.7	8.2	7.1	7.8
Chemicals	3.0	2.7	2.6	2.8	2.5	2.2	2.4
Petroleum Refining	2.0	2.1	2.1	2.2	2.3	2.3	2.4
Metals	2.1	2.2	2.2	2.2	2.4	1.7	1.9
Mineral Products	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oil and Gas Production, and Marketing	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Industrial Organic Solvent Use	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other Processes	0.9	0.9	1.0	1.0	1.0	0.9	1.1
Other Sources, Total	12.6	12.7	10.1	8.8	9.3	7.3	9.7
Solid Waste	6.1	4.7	4.0	3.6	3.2	2.9	2.8
Stationary Fuel Combustion	1.2	1.2	1.3	1.3	1.3	1.2	1.2
Electric Utilities	0.2	0.2	0.3	0.3	0.3	0.3	0.3
Industrial	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Residential, Commercial, and Institutional	0.5	0.5	0.5	0.5	0.5	0.4	0.4
Miscellaneous	5.3	6.8	4.8	3.9	4.8	3.2	5.7
Forest Wildfires and Managed Burning	3.5	5.1	3.6	2.9	3.9	2.3	4.8
Agricultural Burning	1.4	1.3	0.8	0.6	0.5	0.5	0.5
Coal Refuse Burning	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Structural Fires	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Miscellaneous Organic Solvent Use	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total, All Sources	99.8	100.2	102.0	98.3	91.5	85.9	87.2

A zero (0.0) indicates emissions of less than 50,000 metric tons per year.

Transportation includes emissions from all mobile sources. Highway vehicles include passenger cars, trucks and buses. Non-highway vehicles include aircraft, railroads, vessels, and miscellaneous mobile engines such as farm equipment, industrial and construction machinery, lawnmowers, and snowmobiles.

Industrial Processes includes emissions resulting from operation of process equipment by manufacturing industries. In addition, the categories Oil and Gas Production and Marketing (crude oil and natural gas production, petroleum storage tanks and transfer facilities, and gasoline service stations) and Industrial Organic Solvent Use (surface coating and degreasing of manufactured products, printing and publishing) are included under industrial processes. Other Processes represents combined emissions from pulp and paper, wood products, agricultural, rubber and plastics, and textile industries.

12-7 Carbon Monoxide (CO) Emission Estimates, 1970-1976 (cont.)

Solid Waste includes emissions from combustion of waste in municipal and other incinerators, and open burning of domestic and municipal refuse.

Stationary Fuel Combustion is defined to be all fuel use in stationary combustion equipment such as boilers and stationary internal combustion engines. Emissions are shown for electric utility power plants, industrial establishments, and other fuel consumers (residential, commercial, governmental, and schools).

Miscellaneous includes emissions from combustion of forest, agricultural and coal refuse materials, and structural fires. Also included are estimated emissions from consumption of organic solvents not accounted for in industrial processing operations. This includes trade sales of surface coating, dry cleaning, cutback asphalt paving, and other commercial and domestic consumption of organic solvents.

Source: U.S. Environmental Protection Agency, Office of Air and Waste Management, National Air Quality and Emissions Trends Report, 1976, published December 1977, pp. 5-2 to 5-8.

12-8 Hydrocarbon (HC) Emission Estimates (1), 1970-1976
(in million metric tons/year)

Source (2)	1970	1971	1972	1973	1974	1975	1976
Transportation, Total	12.6	12.3	12.6	12.2	11.3	10.9	10.8
Highway Vehicles	11.1	10.8	11.0	10.6	9.8	9.4	9.3
Non-Highway Vehicles	1.5	1.5	1.6	1.6	1.5	1.5	1.5
Industrial Processes, Total	8.5	8.5	8.9	9.4	9.2	8.5	9.4
Chemicals	1.5	1.4	1.5	1.6	1.6	1.5	1.6
Petroleum Refining	0.7	0.7	0.7	0.8	0.8	0.8	0.9
Metals	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Mineral Products	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oil and Gas Production and Marketing	2.7	2.8	2.9	2.9	2.9	2.9	3.0
Industrial Organic Solvent Use	2.7	2.7	2.9	3.1	2.9	2.4	2.9
Other Processes	0.7	0.7	0.7	0.8	0.8	0.7	0.8
Other Sources, Total	8.6	8.5	8.2	8.2	8.1	6.8	7.7
Stationary Fuel Combustion	1.5	1.5	1.5	1.6	1.5	1.4	1.4
Electric Utilities	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Industrial	1.3	1.3	1.3	1.4	1.3	1.2	1.2
Residential, Commercial, and Institutional	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Solid Waste	1.7	1.4	1.1	1.0	0.9	0.8	0.8
Miscellaneous	5.4	5.6	5.6	5.6	5.7	4.6	5.5
Forest Wildfires and Managed Burning	0.7	1.0	0.7	0.6	0.6	0.4	0.8
Agricultural Burning	0.3	0.3	0.2	0.1	0.3	0.1	0.1
Coal Refuse Burning	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Structural Fires	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Miscellaneous Organic Solvent Use	4.3	4.2	4.6	4.8	4.7	4.0	4.5
Total, All Sources	29.7	29.3	29.7	29.8	28.6	26.2	27.9

A zero (0.0) indicates emissions of less than 50,000 metric tons per year.

(1) Estimates for Hydrocarbon (HC) emissions include all forms of hydrocarbons.

(2) For definitions of sources see Table 12-7.

Source: U.S. Environmental Protection Agency, Office of Air and Waste Management, National Air Quality and Emissions Trends Report, 1976, published December 1977, pp. 5-2 to 5-8.

12-9 Nitrogen Oxides (NOx) Emission Estimates, 1970-1976
(in million metric tons/year)

Source (1)	1970	1971	1972	1973	1974	1975	1976
Stationary Fuel Combustion, Total	10.9	11.2	11.7	12.1	11.9	11.2	11.8
Electric Utilities	5.1	5.4	5.9	6.3	6.2	6.1	6.6
Industrial	5.1	5.1	5.1	5.1	5.0	4.5	4.5
Residential, Commercial, and Institutional	0.7	0.7	0.7	0.7	0.7	0.6	0.7
Transportation, Total	8.4	8.9	9.4	9.7	9.6	9.9	10.1
Highway Vehicles	6.3	6.7	7.1	7.3	7.3	7.6	7.8
Non-Highway Vehicles	2.1	2.2	2.3	2.4	2.3	2.3	2.3
Other Sources, Total	1.1	1.2	1.1	1.1	1.1	1.1	1.1
Industrial Processes	0.6	0.6	0.7	0.7	0.7	0.7	0.7
Chemicals	0.2	0.2	0.3	0.3	0.3	0.3	0.3
Petroleum Refining	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Metals	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mineral Products	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Oil and Gas Production, and Marketing	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Industrial Organic Solvent Use	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other Processes	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Solid Waste	0.3	0.3	0.2	0.2	0.2	0.2	0.1
Miscellaneous	0.2	0.3	0.2	0.2	0.2	0.2	0.3
Forest Wildfires and Managed Burning	0.1	0.2	0.1	0.1	0.1	0.1	0.2
Agricultural Burning	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Coal Refuse Burning	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Structural Fires	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Miscellaneous Organic Solvent Use	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total, All Sources	20.4	21.3	22.2	22.9	22.6	22.2	23.0

A zero (0.0) indicates emissions of less than 50,000 metric tons per year.

(1) For definitions of sources see Table 12-7.

Source: U.S. Environmental Protection Agency, Office of Air and Waste Management, National Air Quality and Emissions Trends Report, 1976, published December 1977, pp. 5-2 to 5-8.

12-10 Sulfur Oxides (SOx) Emission Estimates, 1970-1976
(in million metric tons/year)

Source (1)	1970	1971	1972	1973	1974	1975	1976
Stationary Fuel Combustion, Total	22.3	21.5	21.8	22.9	21.9	20.6	21.9
Electric Utilities	15.7	15.6	16.0	17.5	17.0	16.7	17.6
Industrial	4.6	4.0	4.0	3.7	3.3	2.5	2.6
Residential, Commercial, and Institutional	2.0	1.9	1.8	1.7	1.6	1.4	1.7
Industrial Processes, Total	5.9	5.5	6.1	5.8	5.3	4.2	4.1
Chemicals	0.5	0.5	0.6	0.5	0.4	0.3	0.3
Petroleum Refining	0.6	0.6	0.7	0.8	0.8	0.7	0.7
Metals	4.1	3.6	4.0	3.7	3.3	2.5	2.4
Mineral Products	0.5	0.6	0.6	0.6	0.6	0.5	0.5
Oil and Gas Production, and Marketing	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Industrial Organic Solvent Use	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other Processes	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Other Sources, Total	0.9	0.9	0.9	1.0	1.0	0.9	0.9
Transportation	0.7	0.7	0.7	0.8	0.8	0.8	0.8
Highway Vehicles	0.3	0.3	0.3	0.4	0.4	0.4	0.4
Non-Highway Vehicles	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Solid Waste	0.1	0.1	0.1	0.1	0.1	0.0	0.0
Miscellaneous	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Forest Wildfires and Managed Burning	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Agricultural Burning	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Coal Refuse Burning	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Structural Fires	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Miscellaneous Organic Solvent Use	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total, All Sources	29.1	27.9	28.8	29.7	28.2	25.7	26.9

A zero (0.0) indicates emissions of less than 50,000 metric tons per year.

(1) For definitions of sources see Table 12-7.

Source: U.S. Environmental Protection Agency, Office of Air and Waste Management, National Air Quality and Emissions Trends Report, 1976, published December 1977, pp. 5-2 to 5-8.

12-11 Total Suspended Particulate (TSP) Emission Estimates (1), 1970-1976
(in million metric tons/year)

Source (2)	1970	1971	1972	1973	1974	1975	1976
Industrial Processes, Total	12.4	11.8	11.1	10.9	9.4	6.9	6.3
Chemicals	0.3	0.3	0.3	0.3	0.3	0.2	0.3
Petroleum Refining	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Metals	2.1	1.9	1.9	2.1	1.9	1.3	1.3
Mineral Products	7.7	7.3	6.7	6.3	5.4	3.7	3.2
Oil and Gas Production, and Marketing	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Industrial Organic Solvent Use	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other Processes	2.2	2.2	2.1	2.1	1.7	1.6	1.4
Stationary Fuel Combustion, Total	7.1	6.6	6.4	6.5	5.6	5.3	4.6
Electric Utilities	4.1	4.0	4.0	4.3	3.8	3.9	3.2
Industrial	2.6	2.2	2.0	1.8	1.4	1.1	1.1
Residential, Commercial, and Institutional	0.4	0.4	0.4	0.4	0.4	0.3	0.3
Other Sources, Total	3.1	3.0	2.8	2.5	2.5	2.2	2.5
Transportation	1.1	1.1	1.2	1.2	1.2	1.2	1.2
Highway Vehicles	0.7	0.7	0.8	0.8	0.8	0.8	0.8
Non-Highway Vehicles	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Solid Waste	1.1	0.8	0.7	0.6	0.5	0.4	0.4
Miscellaneous	0.9	1.1	0.9	0.7	0.8	0.6	0.9
Forest Wildfires and Managed Burning	0.5	0.7	0.5	0.4	0.5	0.3	0.6
Agricultural Burning	0.3	0.2	0.2	0.1	0.1	0.1	0.1
Coal Refuse Burning	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Structural Fires	0.0	0.1	0.1	0.1	0.1	0.1	0.1
Miscellaneous Organic Solvent Use	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total, All Sources	22.6	21.4	20.3	19.9	17.5	14.4	13.4

A zero (0.0) indicates emissions of less than 50,000 metric tons per year.

(1) Emission estimates for Total Suspended Particulates (TSP) include both suspended and settled particulates generated by man's activities. (Ambient TSP measurements include only a specific size of suspended particulates.)

(2) For definitions of sources see Table 12-7.

Source: U.S. Environmental Protection Agency, Office of Air and Waste Management, National Air Quality and Emissions Trends Report, 1976, published December 1977, pp. 5-2 to 5-8.

12-12 Compliance Status of Major Air Pollution Sources, 1978
(in percentages, unless otherwise noted)

Industry	SIC Code (1)	Total No. of Plants	In Compliance		In Violation		Unknown	
			Emissions Limitations (2)	Compliance Schedules (3)	Emissions Limitations (2)	Compliance Schedules (3)	Emissions Limitations (2)	Compliance Schedules (3)
Total, Major Stationary Sources (4)		23,760(a)	88	4	4	1	N.A.	N.A.
Iron and steel		51(b)	6	10	84	0	0	0
Primary smelters		27	48	4	48	0	0	0
Municipal incinerators		87(c)	49	23	15	8	0	0
Power plants(coal/oil)		623	57	21	12	2	8	0
Aluminum reduction	3334	47	62	28	6	4	0	0
Pulp and paper	2611,2621	233	75	15	7	2	0	1
Petroleum refineries		233(d)	81	11	5	0	2	1
Portland cement	3241	188	84	6	6	3	1	0
Sulfuric acid	2819	225	84	7	6	2	1	0
Coal cleaning	1211	326	87	8	5	0	0	0
Grey iron	3321	444	88	6	4	2	0	0
Phosphatic fertilizers	2871,2874	104	93	4	1	0	2	0
Asphalt concrete	1611,2951	2,687	96	2	1	0	1	0
Total, 13 Industries		5,275	85	7	5	1	2	0

N.A.- Not Available.

(1) Standard Industrial Classification code.

(2) Actual emission limitations.

(3) Plans being developed or equipment being purchased and installed to meet actual emission limitations.

(4) Major (or Class A) sources are facilities individually capable of emitting more than 100 tons of a pollutant per year. The 13 major industries listed here include 5,275 sources, or about one fifth of all major stationary sources.

12-12 Compliance Status of Major Air Pollution Sources, 1978 (cont.)

(a) Includes 510 sources which have no applicable regulations.

(b) Includes 1 plant with no applicable State Implementation Plan (SIP).

(c) Includes 4 permanently shut down plants.

(d) Includes 2 permanently shut down plants.

Sources: U.S. Environmental Protection Agency, Division of Stationary Source Enforcement, unpublished data; and U.S. Environmental Protection Agency, Compliance Status of Major Air Pollution Facilities, May 1978, Part I - Summary Table.

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